February 3, 2009

EPA COMMENTS

ON THE

CHEVRON MINING INC – QUESTA MINE
DRAFT FEASIBILITY STUDY

DATED: AUGUST 12, 2008

The U.S. Environmental Protection Agency (EPA) has completed its review of the Chevron Mining Inc. – Questa Mine (CMI; formerly Molycorp, Inc.) draft Feasibility Study Report (FS Report), dated August 12, 2008, for the Molycorp site (Site). The review was performed in accordance with the 2007 Federal/State Agreement between EPA and the New Mexico Environment Department (NMED). The EPA reviewed the FS Report for consistency with the EPA's Administrative Order on Consent for Remedial Investigation and Feasibility Study and the Statement of Work (SOW) attached thereto (AOC; Docket No. 6-09-01), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan (NCP), and relevant EPA policy and guidance. Additionally, EPA reviewed the FS Report to assess whether all previous EPA comments on the Draft Final Alternatives Evaluation Report were adequately addressed, since EPA elected not to finalize that report, but incorporate it into the FS Report. The EPA has also coordinated its review with NMED and the New Mexico Energy, Minerals, and Natural Resources Department's (EMNRD's) Mining and Minerals Division (MMD) and has incorporated their comments herein. Based on the EPA review, there are a substantial number of technical deficiencies, issues, and concerns which must be adequately addressed before the FS Report can be approved. There are also a number of other issues that have been raised by CMI and its Counsel at meetings held between EPA, NMED, MMD and CMI and also in letters to EPA and NMED during the summer and fall of 2008, as they relate to the FS, as well as the overall RI/FS process as directed by EPA and whether such process is consistent with CERCLA and the NCP. To the extent that EPA considers these other issues directly relevant to the content of the FS Report, they have been evaluated as part of EPA, NMED and MMD reviews of the FS Report and are incorporated into or referenced as appropriate in the EPA comments. The EPA comments are stated below. They are divided into two groups: General Comments and Specific Comments.

General Comments:

1. Pre-decisional Statements on EPA Remedy Selection:

   The EPA will not allow CMI to make pre-decisional statements in the FS Report which attempt to limit or constrain EPA decision-making under CERCLA and the NCP (*e.g.,* Executive Summary; Section 1; Section 4) based on CMI's opinions, preferences, or any potential matter of dispute between EPA and CMI. Such statements attempt to influence or limit the range of alternatives in EPA's remedy selection process and are inappropriate. Further, matters of dispute must be addressed in accordance with the Dispute Resolution requirements set forth in Section XX of the AOC. Please delete all such statements.

2. Executive Summary:

   The Executive Summary should contain enough information to enable the reader to understand the general scope and extent of the FS Report, including the evaluations completed for the screened alternatives. The Executive Summary should not contain assumptions and limitations related to the performance of the FS, pre-decisional statements on EPA remedy selection or any potential matters of dispute. Any assumptions or limitations should either be compiled in a section titled "Assumptions and Limitations" at the end of the document, provided in a separate letter or deleted. As stated above, any pre-decisional statements by CMI on EPA decision-making should be deleted. Please rewrite the Executive Summary to present an overall summary of the FS Report, the alternatives selected for detailed analysis, and the results of the analysis. Specific comments contained herein address this matter further.

3. Green Remediation:

   In the alternative analyses for implementability, CMI includes estimates of the amount of energy to be consumed and carbon (CO_2) produced for each alternative. As part of its mission for protecting human health and the environment and need for environmental stewardship, EPA is exploring approaches to develop "green remediation" practices that encourage energy efficiency and conservation during cleanup of contaminated sites. With this effort, EPA strives for cleanups that use natural resources and energy efficiently, as well as reduce negative impacts on the environment to the greatest extent possible. Hence, EPA believes it is appropriate to include this information in the appropriate sections of the FS Report, as EPA will consider all environmental effects of implementation as part of its evaluation. However, CMI needs to include additional information (*e.g.,* calculations and assumptions) to support the energy and CO_2 estimates provided. Specific comments contained herein address this matter further.

4. Additional Cover Design Option for Tailing Facility Area Consistent with Commercial Land Use for Renewable Energy Project:

   Based on discussions at the December 11, 2008 meeting in Santa Fe, NM, between EPA, NMED, EMNRD, CMI, and other Chevron companies regarding interest in siting a renewable energy project at the Site, it is appropriate to develop an alternative cover option in the FS consistent with such a commercial land use scenario for the tailing facility. The current cover design in the FS Report consists of a three-foot thick soil cover. Any alternate cover option would still need to meet the Remedial Action Objectives (RAOs) set forth in the FS Report, including protection of ground water during and after any renewable energy projects. Please add a cover option for a commercial renewable energy land use, in addition to the existing 3-foot soil cover requirement for the source containment alternatives.

5. Institutional Controls:

   a. The EPA and NMED are evaluating CMI's draft Deed of Conservation Easement proposed for the mine site and Declaration of Restrictive Covenants proposed for the tailing facility. The EPA and NMED plan to continue discussing these proposed institutional controls (ICs) with CMI, as well as other potential stakeholders [*e.g.,* village of Questa (Village) and Taos County] over the next several months. There are issues which still have to be resolved regarding the ICs, including CMI's proposal for EPA's and NMED's role as third-party beneficiaries to enforce the ICs, issues regarding potential conveyance of interest in real property according to state law and how such interest would relate to CERCLA Section 107(j), NMED's position on restrictions to ground water, and other such matters. Some of these issues were raised by CMI in its July 3, 2008 letter to EPA.

   b. In accordance with regulations 20.6.2.3101 New Mexico Administrative Code (NMAC) and 20.6.2.3103 NMAC, which are preliminary applicable or relevant and appropriate requirements (ARARs) under CERCLA, all mining related ground-water contamination at the Site must be mitigated, including those ground waters beneath tailing and waste rock. Hence, permanent well drilling or water use restrictions are not acceptable as a component of any remedial alternative, other than the limited action alternative, unless specifically intended to prevent exposure to ground water on an interim basis while conducting active response measures or protect the integrity of a cap or cover. Please delete such references to permanent ground-water use restrictions, as appropriate.

6. Targeted Slopes for Regrading of Waste Rock Piles:

   In Section 7 – Detailed Analysis of Alternatives, CMI proposes regrading the waste rock piles at the mine site to targeted overall slope ratios of 2H:1V (horizontal : vertical or H:V). Benched slopes with an overall ratio of 2H:1V have interbench slopes that are steeper than 2H:1V. The NMED ground-water Discharge Permit (DP-

1055) and the MMD's Mining Act Permit (Permit No. TA001RE) require 3H:1V interbench slopes as specified in their Closure/Closeout Plans for reclamation of the rock piles. The 3H:1V interbench slope is intended to provide increased stability to the waste rock piles, reduce surface water flows and velocities to reduce erosion, and promote vegetative growth. There have been lengthy discussions between EPA, NMED, MMD, and CMI at technical meetings on the regrading and resloping issues and the status of the permit conditions as potential ARARs or To-Be-Considered (TBC) materials for any CERCLA response action. Based on its ARARs review, EPA does not consider the NMED and MMD 3H:1V interbench slope requirements to be an ARAR. However, the Closeout/Closure Plans have been identified as potential TBC materials for protectiveness of the remedy. The 3H:1V interbench slope requirement in those Plans would therefore be considered potential TBCs.

The EPA has also re-examined this issue from the standpoint of protectiveness under CERCLA. First and foremost, it is EPA's responsibility to ensure that the remedial alternatives developed in the FS satisfy the first threshold criterion of CERCLA for protectiveness of human health and the environment. In reviewing hard rock mining reclamation projects at sites throughout the western United States and federal and state regulations regarding such reclamation, the regrading of waste rock to slopes ranging from 2H:1V to 3H:1V is standard industry practice for the mine reclaiming industry. However, EPA is not aware of any federal statute or regulation that mandates a specific slope. The U.S. Department of the Interior's Office of Surface Mining, Reclamation, and Enforcement (OSM) has a preference for 3H:1V or shallower slopes, based on several large site-specific slope stability analyses for coal mining valley fills. The U.S. Bureau of Land Management (BLM), Nevada Office Manual Handbook Supplement H-3809-1 guidelines recommends that waste rock dump surfaces not exceed 3H:1V slopes. Additionally, BLM recommends slopes of 2.5H:1V to 3H:1V for successful re-vegetation of rock piles in arid climates (*see also* 1999 BLM paper entitled "Mine Revegetation in Nevada: the State of the Art in the Arid Zone"). The BLM indicates that reclaimed slopes that are too steep have high levels of erosion that prevent successful revegetation. The U.S. Bureau of Reclamation indicates that it now prefers slopes shallower than 3H:1V for most final slopes (barring site-specific analysis), since it has found evidence of failure for cover materials on slopes equal to or steeper than 3H:1V. The U.S. Forest Service Region IV Technical Advisory Council (sponsored by the mining groups Nevada, Northwest and Idaho Mining Associations) recommends that slopes be graded to 3H:1V or flatter for fine-grained or non-durable waste materials or when hazards exist for internal drainage.

In reviewing state regulatory programs, EPA found that slope regrade requirements typically range from 2H:1V to shallower than 3H:1V. First, as stated above, the State of New Mexico's NMED and MMD seek interbench slopes no steeper than 3H:1V (unless the underlying slopes are steep) at mine sites throughout the state (*e.g.,* Tyrone and Chino Copper Mines). The State of Utah requires that waste rock be regraded to a stable configuration, and by policy requires 2H:1V minimum slope, but prefers final slopes of 3H:1V. The State of California requires that final reclaimed

slopes not exceed 2H:1V. The State of Colorado requires slopes no steeper than 2H:1V for both hard rock and coal mine reclamation, but also has requirements for shallower slopes in mine reclamation areas near lakes or ponds or as determined by its regulatory agency. The State of Montana also accepts slopes near 2H:1V: a slope of 2.1H:1V was selected for portions of the Golden Sunlight Mine. It should also be noted that at the Zortman/Landusky Mine Sites in Montana, covered slopes shallower than 2H:1V with benches at every 100 vertical feet of elevation change were mandated in the ROD to ensure stability. In Arizona, the reclamation plan for the Rosemont Copper Mine requires regrade of the waste rock piles to a 3H:1V slope.

In addition to the considerations of long-term slope stability and waste rock pile reclamation success, there are the inherent dangers of personnel fatalities and injuries associated with constructing, repairing and maintaining steeper slope surfaces. The risk of equipment roll-over due to operating either on a slope in a direction not perpendicular to the slope's contour, or too close to the edge of a bench, increases markedly on steeper slopes, such as 2H:1V, as compared to milder slopes, such as 3H:1V. The higher risk incidence becomes exacerbated because of the increased need for maintenance and repair on steeper slopes.

The EPA has also examined other information related to the Site which could influence its determination as to the appropriate slope for overall protectiveness. This includes the effects of hydrothermal alteration and in-situ acid weathering on the pyrite-rich waste rock piles and the implications for mine slope and rock pile stability. Mineralogical changes in the pyritic waste rock from hydrothermal alteration and from weathering after open-pit mining potentially have considerable consequences for the long-term stability of slopes and piles (*see also* Robertson, Paper No. 175-2, Mine Rock Piles and Pyritically Altered Areas: Their Slope Stability and Effect on Water Quality, 2005; GSA Abstracts with Programs, Vol. 37, No. 7, page 393 *and* Kuhn, Alan K., "Geotechnical Considerations in Surface Mine Reclamation", 1999 Proceedings of the American Society for Surface Mining and Reclamation, Volume 2, pp. 481-489, August 1999). It is the nature of end-dumped waste rock piles that the outslopes assume the angle of repose, of the waste rock material. It is also the case that the friction angle tends to decrease over time due to the effects of infiltrated moisture and weathering, including mechanical and chemical alterations. Consequently, angle-of-repose outslopes may not represent a long-term stable configuration and the 2H:1V slopes would naturally trend to lower angle slopes. ("Sugar Shack West Rockpile: Operational Geotechnical Stability Failure Modes Analysis Draft Report", Norwest Corporation, April 25, 2007).

Studies by the USGS on in-situ acid weathering reactions in unmined areas in southern Rocky Mountains with similar mineralogy to the Site [quartz-sericite-pyrite (QSP) assemblages] show an inversely linear decrease in chlorite and pyrite with increasing smectite (Bove, et. al, 2005; GSA Abstracts with Programs, Vol. 37, No. 7, page 394). USGS mapping of minerals at the mine site using Airborne Visible – Infrared Imaging Spectrometer (AVIRIS) technology shows moderate to strong sericite – kaolinite alteration, as well as the presence of smectite (montmorillonite) at

the surface of the waste rock piles (*see also* Livo, et al; 2001). The formation of this highly swelling clay from weathered pyrite-rich rock has important implications for rock pile stability, as the formation of clay can reduce the shear strength of the rock, resulting in a lower factor of safety (*see also* Bove, et al, 2005 and Wilson, et al, 2005; GSA Abstracts with Programs, Vol. 37, No. 7, page 394). A clay mineralogy study of the Goathill North waste rock pile confirms the increased presence of illite and smectite within the outermost weathered and oxidized zones of Mine Site Area waste rock piles (*see also* Donahue, et al; 2005 GSA Abstracts with Programs, Vol. 37, No. 7, page 394). In the characterization of the roadside rock piles performed as part of EPA's CERCLA RI/FS, x-ray diffraction (XRD) analyses on drill cuttings taken from mixed-volcanic mine rock within the Middle Waste Rock Pile at depths over 200 feet from the surface of the pile showed the presence of smectite at over 30 percent of the bulk sample (URS – December 2005 RI/FS technical meeting and Draft Final RI Report). The studies by Donahue and URS appear to support the work of the USGS on similar QSP mineral assemblages.

Chemistry, mean temperature, oxygen (O^2) and carbon dioxide (CO_2) data collected from within the waste rock piles by CMI, Robertson and Norwest provide evidence that the piles are breathing and significant oxidation and weathering of pyrite is occurring within the piles. Elevated temperatures were encountered in waste rock deep within the piles, including temperatures over 160º F in the roadside rock piles. Elevated temperatures were associated with depleted O^2 and elevated CO_2 levels, indicated pyrite oxidation and dissolution of carbonates. At such temperatures, the weathering rates are accelerated significantly. Secondary weathering minerals were observed throughout the Goathill North rock pile by field observation and x-ray diffraction (XRD) methodology during CMI's Goathill North weathering project, indicating intensely weathered zones deep within the pile. They included illite, smectite, abundant gypsum and iron oxides. The secondary weathering mineral assemblages were spatially evident relative to textural zones within the pile and appeared to be independent of the location within the pile (Dr. J. Marcoline, personal comm.). These weathering products have properties than can adversely affect stability such as the brittle nature of the oxides, the fine grained size of the clay particles and the swelling nature of the clays.

It is noted that EPA has verbally requested all available information on CMI's Goathill North weathering project and any related technical papers that have been published. It is our understanding that this information will be provided to EPA, NMED and MMD. CMI has also indicated that the final report for the weathering study will be available for review by mid-March. The EPA is also aware that authors of CMI's Goathill North weathering project may have formed conclusions regarding the presence and origin of the smectite clays, the implications for weathering and stability, and other technical issues on stability which somewhat contradict the work of those scientists referenced herein.

Based on the information discussed above, EPA believes that there is enough information on the weathering of hydrothermal altered and pyrite-rich waste rock at

and in the vicinity of the Site to raise concerns regarding the potential formation of swelling clays and other secondary minerals that may adversely affect the rock piles long-term stability. Taking into account the range of slopes required for other hard rock mining reclamation projects, the potential for decrease in the long-term stability for the mine rock piles at the Site by effects of the existing hydrothermal alteration and the ongoing in-situ acid weathering, the optimal slopes for successful re-vegetation, and increased risk to personnel working on steeper slopes, EPA considers the 3H:1V interbench slope specified by NMED and MMD in its permit conditions to be an appropriate slope angle when considering protectiveness of human health and the environment.

Therefore, CMI shall revise the alternatives for the Mine Site Area to specify regrading the waste rock piles to targeted interbench slopes no steeper than 3H:1V. For rock piles where the underlying slopes are too steep to achieve the 3H:1V interbench slope, the shallowest slope practicable must be conceptualized for the regrade option.

For the partial removal option, CMI shall specify that the remaining waste rock shall be regraded to interbench slopes no steeper than 3H:1V, to the maximum extent practicable. The estimated volume of waste rock to be removed must be sufficient to allow achievement of the 3H:1V interbench slope for the remaining waste rock.

Finally, EPA believes that regardless of the slope requirement deemed appropriate for protectiveness, a detailed slope stability analysis will still need to be performed for each waste rock pile during remedial design to address slope and factors of safety (FOS) requirements.

7. Waste Rock Piles Targeted For Partial Removal:

In the subalternatives for partial removal of the waste rock piles, the rock piles selected by CMI for partial removal were those that could not be regraded to overall slopes of 2H:1V. In light of the previous EPA comment on targeting regrades to 3H:1V interbench slopes, the Capulin waste rock pile shall also be selected for partial removal if it cannot be regraded to 3H:1V interbench slopes. Please revise the FS Report accordingly.

8. Cover Design for Waste Rock Piles:

Based on the description of the cover alternatives for the waste rock piles, it is EPA's opinion that the level of uncertainty for the cover alternatives achieving all the RAOs presented in Table 4-2 is fairly high. Specifically, the following RAO's would have to be met by the cover alternatives:

- Eliminate or reduce, to the maximum extent practicable, leaching and migration of inorganic contaminants of concern (COC's) and acidity from mine waste rock (acid rock drainage) to ground water at concentrations and quantities that have the

potential to cause exceedances of the numerical ground water ARARs; or preliminary Site-specific risk based cleanup levels (*see also* Specific Comment No. 50, below);

- Restore habitat to a condition which will allow for the establishment of a self-sustaining ecosystem;

- Restore contaminated ground water to meet state/federal ARARs or preliminary Site-specific risk based cleanup levels for inorganic COCs;

- Eliminate or reduce, to the maximum extent practicable, the migration of mine-related inorganic COCs in ground water to Red River surface water at concentrations that would result in surface water concentrations exceeding surface water ARARs or preliminary Site-specific risk based cleanup levels.

CMI has not demonstrated to the satisfaction of EPA how this conceptual cover design will achieve these RAOs. CMI has proposed using three feet of amended, non-acid generating waste rock from the Spring Gulch rock pile passing an 8-inch screen. Although EPA recognizes the practicability of using this on-Site borrow source, it considers the Spring Gulch material to be a relatively poor option for use in a store and release cover because of its physical properties (*see also* EPA/NMED March 5, 2008 letter), as well as the presence and distribution of sulfide minerals and their potential for acid rock drainage (ARD), the elevated concentrations of molybdenum, and the difficulties anticipated in separating out suitable non-acid generating waste rock from unsuitable material (EPA notes the difficulty of CMI field sampling teams to locate suitable Spring Gulch material for molybdenum toxicity and bioavailability testing in 2008).

Additionally, MMD has indicated to EPA that while the experimental revegetation test plots at the Questa mine, that included three-foot Spring Gulch covers, have produced some valuable information, the overall trajectory of vegetative development is disappointing for most treatments and unlikely to meet MMD permit (TA001RE, Revision 96-2) conditions for quantity and quality of vegetation (Sections 6-Q) or for timeliness (Section 6-O) of performance.

Further, it is EPA's opinion that the use of three feet of rock with similar material characteristics as the underlying waste rock would likely not be successful as a store and release cover without significant amendment. CMI provides some detail of the amendments proposed, primarily for costing purposes, but it is inadequate in addressing EPA's concerns (*see also* General Comment No. 21, below, on use of amendments with Spring Gulch waste rock material). More information needs to be provided on the type and volumes of the amendments proposed, as well as the basis for such proposal.

Please provide sufficient information and detail in the alternative description to demonstrate how this conceptual cover design will be able to meet the RAOs

presented above. What are the types and volumes of amendments estimated to be needed to achieve sufficient plant growth and moisture holding capacity of the Spring Gulch cover material? How will the suitable non-acid generating Spring Gulch material be identified and segregated from the non-suitable material? CMI needs to discuss the significant aspects of the cover alternative and any uncertainties associated with them. If this demonstration can not be done to EPA's satisfaction, CMI will have to modify the proposed cover alternative.

Also, as stated in the March 5, 2008 letter, EPA did not review or approve any aspect of the Borrow Materials Study, as it was conducted under the direction and oversight of MMD. Therefore, it has not been subject to the requirements of the AOC. If CMI adequately demonstrates that the cover alternative would meet the RAOs, the use of the Spring Gulch rock pile material may be deemed acceptable by EPA at a conceptual, preliminary design level for purposes of the FS and EPA remedy selection. However, final approval of the Spring Gulch material as the borrow source, including all plans, specifications, and any further testing of its suitability, will be required from EPA and NMED during design of the remedy.

Finally, in light of these uncertainties, EPA believes it appropriate to perform a cost sensitivity analysis on the conceptual cover design. The EPA guidance on conducting the RI/FS (Section 6) suggests a cost sensitivity analysis be performed to assess the effect that variations in specific assumptions associated with design, implementation, and performance can have on estimated costs. The areas of uncertainty that may have significant effects on cost should be highlighted and the rationale for selecting the most favorable assumptions provided. To evaluate the effect on the cost of the cover alternative because of these uncertainties, CMI is directed to vary the assumptions and note the effects on cost for the conceptual cover design. For example, what would the effect on cost be if the three feet of amended Spring Gulch rock was varied to two feet of amended Spring Gulch rock overlain with one foot of growth medium? This is a reasonable variation for cost sensitivity analysis. It is also consistent with EPA's March 5, 2008 comment (Specific Comment No. 21.b) for the need to consider varying cover designs, borrow materials, depths of cover, amendments and vegetation approaches for these alternatives. CMI has not adequate addressed Comment No. 21.b in the FS Report.

9. Inadequacy of the Tailing Facility Ground-Water Alternatives:

In the ground-water alternatives for the tailing facility, CMI proposes replacing selected existing seepage barriers to increase the collection of tailing seepage from Dam 1 and the eastern flank of Dam 4, and continue operation of the seepage interception system and the pumpback system (*see also* Table 6-6, Alternative 3, Subalternative 3B and 3C, page 3 of 5, under Alternative Description). However, it is not clear how this alternative is going to be more effective at collecting seepage than the existing systems. In its letter to CMI, dated March 5, 2008, EPA stated that it does not believe the existing seepage interception and pumpback systems are capturing all of the contamination from Dam 1 and along the eastern flank of Dam 4,

and a more robust ground-water alternative needs to be proposed. The EPA also stated that the ground water alternatives need to include an appropriate design of extraction wells/barriers to mitigate the upper alluvial aquifer contamination, based on current contaminant mapping efforts from the RI. Such design should not solely rely on the existing seepage collection and withdrawal systems. The ground-water alternatives proposed by CMI do not adequately address this comment, as CMI has not demonstrated to the satisfaction of EPA how the RAOs listed in Table 4-2 are going to be attained based on this replacement strategy.

Please provide more detailed information on the alternative and how it expands or improves upon the existing systems. Key maps and cross-section should be provided showing contaminant concentrations (*e.g.,* molybdenum) in ground water and where/how the existing systems will be expanded or modified. The maps need to be at a larger scale than those depicted on Figures 6-8 and 6-9 and show the existing systems and the new components or aspects of the alternative, as well as ground-water contamination. The entire arroyo may be one large conduit for seepage migration. The entire eastern flank of the Dam 4 arroyo may also be one large conduit for seepage migration eastward. Where will the existing systems be expanded to capture all the seepage coming from those areas, based on Site characterization work for delineating the nature and extent of ground-water contamination? Is it appropriate to lengthen the drain collection system? Is it appropriate to extend the seepage barriers across the entire width of the arroyo? Should larger drain pipes be utilized? Will new seepage barriers be proposed at greater depths to capture seepage currently bypassing the existing systems? These are the types of questions which must be considered in the conceptual design for CMI to demonstrate how the replacement of all or portions of the existing seepage barriers will improve seepage capture to meet the RAOs.

Although CMI has not demonstrated that the current pumpback extraction well system in front of Dam 1 and the eastern flank of Dam 4 is effective at capturing seepage (in combination with the seepage interception system), CMI has not proposed additional extraction wells (other than a well in the vicinity of former piezometer TPZ-5B). Where is tailing seepage bypassing the current pumpback system? What expansion of the pumpback system needs to be proposed to address those areas? If there are uncertainties in the contaminant flow paths, additional monitoring wells may also need to be a component of the alternative. The EPA has previously indicated to CMI that additional monitoring wells need to be part of the ground-water alternatives to verify and further delineate the extent of contamination in the areas of TPZ-5B and TPZ-7L. We did not find inclusion of those monitoring wells in the FS Report. As stated above, key contaminant map(s) and a cross-section need to be provided showing nature and extent of contamination and targeted areas for expanded seepage pumpback and barrier system expansion.

Based on the RI findings, CMI's current tailing disposal and water management activities result in the migration of tailing seepage to ground water at and beyond the tailing facility. Such operations, if continued for the remaining operational life of the

tailing facility, will allow it to be a continuing source of ground-water contamination. The EPA has previously commented on the need for other best management practices (BMPs) with alternatives in its March 5, 2008 letter. The NMED, through its ground-water permitting program, is also seeking the implementation of other BMPs by CMI to minimize the spread of contamination to ground water, to the maximum extent practicable. Based on recent correspondence between CMI and NMED on this permitting initiative, CMI has shown a reluctance to implement other BMPs. This issue is discussed further herein (*see also* General Comment No. 10, below). However, without adequate source control measures for tailing seepage during the remaining operational life of the tailing facility or improved BMPs for minimizing ground water contamination, the importance of implementing more robust ground-water cleanup efforts while mining and tailing disposal operations are ongoing cannot be overstated.

Therefore, CMI shall expand the conceptual design of the ground water alternatives to include effective seepage capture systems in front of Dam 1 and along the eastern flank of Dam 4. CMI shall include sufficient information and detail to demonstrate how the expanded ground-water alternatives will be expected to contain and capture all tailing seepage migrating from the tailings facility, including Dam 1 and the eastern flank of Dam 4 seepage, and achieve the RAO's and preliminary ground-water ARARs or Site-specific risk-based cleanup levels. The same comment applies throughout the document where expanded seepage barriers at the tailing facility are discussed, for example page 4-5 of Table 6-6, Alterative 4, and in Section 7.

10. Inadequacy of Tailing Facility Limited Action Alternative:

The FS Report does not adequately address EPA's March 5, 2008 letter (Specific Comment No. 22.c) on the infiltration of tailing seepage to the subsurface at the Dam 5A impoundment and decant pond at the base of the Guadalupe Mountains. In Specific Comment No. 22.c, EPA stated that the RAO to eliminate or reduce, to the maximum practicable, the seeping and migration of inorganic COCs from tailing that would result in ground-water concentrations exceeding ARARs or risk-based cleanup levels would not be met without employing source control measures or BMPs for water management. The EPA also directed CMI to (1) explain why contaminated ground water collected by the seepage interception and pumpback systems is being redirected to the Dam 5A impoundment, if that is where the majority of seepage is escaping containment and entering into the basal (volcanic) aquifer, (2) include measures for achieving this RAO in the Limited Action alternative, and (3) evaluate the possibility of using BMPs as one possible measure. Based on a Water Management Report (SRK, 2008) submitted to NMED for DP-933 and subsequent correspondence between NMED and CMI on that report for identifying alternative water management activities that could reduce tailing seepage impacts to ground water, CMI has determined that the implementation of such BMPs is not practicable and declined to implement them.

In light of these discussions and the inadequacy of the FS Report in addressing Comment No. 22.c, CMI shall complete the three items specified above. CMI shall include with the description of the Limited Alternative the rationale provided to NMED in the Water Management Report for not electing to implement alternative BMPs to minimize ground water contamination at the tailing facility. Further, if CMI is not willing to propose any effective measures to achieve the RAO, CMI shall document that the Limited Action alternative will not meet the RAOs and that tailing disposal operations will continue to cause infiltration and tailing-seepage flow to ground water beneath and beyond the tailing facility and, indirectly, to the surface water of the Red River through seeps and springs.

11. Ground-Water Restoration Time Frames:

There are no ground-water restoration timeframes included with the alternatives developed for the Tailing Facility Area and Mine Site Area. Consistent with the NCP and EPA policy and guidance, CMI must include restoration timeframes with the ground-water alternatives presented in the FS Report. As stated in the NCP §300.430(a)(1)(iii)(F), EPA's expectation for ground water remediation is to return ground water to its beneficial uses within a reasonable timeframe. The EPA's preference is for rapid restoration. However, the most appropriate timeframe must be determined through an analysis of alternatives during the FS and remedy selection process. The EPA Guidance for Conducting RI/FS under CERCLA (EPA/540/G-89/004; page 4-22) states that timeframes, among other things, should be developed for alternatives such that differences can be identified. The EPA Guidance on Remediation of Contaminated Ground Water at Superfund Sites, Interim Final (EPA/540/G-88/003) states that several types of alternatives that span a range of technologies and restoration timeframes should be developed in the FS, including active restoration that reduces contaminant levels to the cleanup levels in the minimal timeframe. The EPA has raised this issue at previous technical meetings. CMI shall include ground-water restoration timeframes with alternatives for the Tailing Facility Area and Mine Site Area. In developing the timeframes, CMI shall estimate timeframes for restoring all ground water that is protectable under the New Mexico Water Quality Act, including those ground waters beneath or within the footprint of mine waste that would remain in place (*i.e.,* tailing and waste rock).[1] Further, CMI shall discuss the technical limitations that will tend to increase the timeframes, including: (1) the ongoing mining and tailing disposal operations and water management activities that continue to provide a source of ground-water contamination during the remaining operational life of the mine and tailing facility, (2) not implementing BMPs that would limit the amount of water conveyed to the tailing facility or tailing seepage that is pumped back to the Dam 5A and decant ponds to meet NPDES permit requirements for the 002 Outfall, and (3) phased

[1] The restoration of ground water beneath wastes that will remain in place is an issue raised by CMI Counsel in a January 2009 letter to EPA regarding "Point of Compliance" under CERCLA. The EPA has not included a comment on Point of Compliance herein, but will respond to CMI's letter under separate cover.

implementation of covering the rock piles that represent continuing sources of contamination in ground water.

12. Potential Ground-Water Impacts to West of Tailing Facility:

The EPA is concerned that the current water management activities at the tailing facility may be impacting ground water beyond the tailing facility in an area that lacks the detailed characterization of other areas of contaminant migration. Currently, ground water from the mine site is discharged to the tailing facility both in conjunction with and separate from tailing disposal. The ground water from the mine site may or may not be pH adjusted with the addition of lime, depending on if tailing deposition is occurring. Untreated ground water segregated at the 002 Outfall manhole is also pumped back into the tailing facility via the pumpback system. The majority of this water is discharged on the western portion of the tailing facility in the area of Dam 5A and the decant pond. CMI's draft final RI report shows ground water in the basal alluvial aquifer flowing south-southwest to the Red River, and ground water in the deeper (volcanic) bedrock aquifer flowing southwest on the south and west sides of the tailing facility, respectively (draft final RI Figure 3.5-51).

Ongoing tailing-seepage impacts to ground water below the tailing facility and subsequent migration beyond the tailing facility boundary is evidenced by monitoring wells on the south side of the tailing facility, namely monitoring wells MW-11 and MW-13, where concentrations of molybdenum in ground water exceed the 0.05 mg/L PRG and have been increasing in concentration since 2002. In addition, springs along the Red River between the tailing facility and the state fish hatchery have also experienced increasing concentrations of molybdenum in ground-water discharge. Specifically, analytical data showing an increase in molybdenum concentrations at Spring 12 support this conclusion that seepage from the Dam 4 and Dam 5A impoundments is likely discharging into the Red River downstream of the tailing facility.

CMI's ground water flow paths presented in the draft final RI report deviate from the interpretations of Robertson GeoConsultants' (RGC's) modeling report of the lower Red River and tailing facility area (RGC October 1997). Although the model was developed using considerably less data than presently exists from RI activities, there does not seem to be any fatal flaws or any conceptual shortcomings in the model domain. The modeling results show the principal area of discharge in the upper alluvial aquifer to be the reach along the Red River near the Questa Spring, which is interpreted as the source area for Spring 17. In the lower aquifer, which joins with the fractured basalts further to the west, most the flow tends to converge immediately upstream of the state fish hatchery that is interpreted as the source area for Spring 18.

Even though the model was developed with limited hydrogeologic data, both the regional and local model flow patterns appear to be very realistic based on what is now known about the hydrogeology. The main difference between the present CMI interpretation of the where ground water is flowing west of the Dam 4 and Dam 5A

impoundments and RGC's model results is that CMI does not acknowledge that flow paths emanating from ponds behind these dams terminate near the state fish hatchery.

The EPA believes that the current ground-water monitoring network at the tailing facility affords a sufficient level of understanding of the hydrogeologic conditions and contaminant distribution for the FS and remedy selection process. However, there are some conflicting interpretations related to ongoing releases and flow paths of contaminants leaching from the tailing facility to ground water and, indirectly, to surface water.

These conflicting interpretations, coupled with the large loss of water estimated at the Dam 4 and Dam 5A impoundment areas, warrant inclusion of additional multi-level monitoring of ground water to the west and south of the tailing facility, as well as additional surface water quality monitoring downstream of impacted springs in Alternatives 3 and 4 for the Tailing Facility Area. Please revise accordingly.

13. Potential for Tailing Piles to Generate Acid Rock Drainage and Metal Leaching:

Acid rock drainage (ARD) is recognized as one of the most serious environmental issues related to the mining and milling of sulfide ore deposits and disposal of the mine waste byproduct (tailing). At the Questa Community Coalition (QCC) meeting held by EPA in Santa Fe, New Mexico, on September 9, 2008, to discuss the draft final RI Report with stakeholders, the technical advisor for the Rio Colorado Reclamation Committee (RCRC), the community technical assistance grant (TAG) recipient, conveyed concern with the long-term potential for the tailing piles to generate ARD and metal leaching (ML) from weathering processes after tailing disposal operations cease. Although the potential for the tailing facility to generate ARD had been discussed during the RI, the EPA has revisited this issue to ensure that remedial strategies developed in the FS for the tailing facility are appropriate to the ARD-ML risks.

Kinetic testing and mineralogical characterization of the tailing was performed by CMI's consultant, SRK, to predict the tailing's acid generation potential (SRK, 1997). The testing consisted of 9 humidity cell tests that were run for 20 weeks. An assessment of the acid generating potential from those tests by SRK indicated that the tailing material does not have a strong capacity to generate ARD-ML. However, the length of time the humidity cell tests were run (20 weeks) is fairly short compared to more recent Site-specific kinetic testing performed on the waste rock material by Roberson GeoConsultants (RGC) of 44 weeks and the Spring Gulch borrow materials by Golder Associates (2009) of 76 weeks.

The mineralogical testing of the tailing by SRK in the mid-1990s confirmed the presence of pyrite and other sulfide minerals that cause ARD-ML. The analytical results from a limited number of samples showed the tailing to contain three percent sulfides, primarily pyrite, as well as some native sulfur in the deeper tailing. The shallower andesitic tailing has higher sulfide sulfur than the aplite tailing. The

minerals observed in the tailing that can cause ARD include pyrite/pyrrhotite, molybdenite, sphalerite, chalcopyrite and arsenopyrite. The upper tailing has a higher potential to generate acid than the deeper tailing. Based on these findings, it was estimated that about twenty-three (23) percent of the tailing is considered to be acid generating.

The EPA considers the RCRC concern to have merit, given the short testing period and the limitations and uncertainty of kinetic testing, as well as the presence of ARD-causing sulfide minerals in the tailing. ARD is often associated with materials containing as low as 0.2 to 0.5 percent total sulfur. SRK reported total sulfur in the range of 0.2 to 2.5 percent. Therefore, EPA believes it appropriate to collect additional kinetic testing data as part of any source control/ground-water alternative for the tailing facility to verify the testing results of SRK and the appropriateness of the alternative with regards to ARD-ML. Please include the performance of additional kinetic testing for at least a 52-week testing period as a component of the Tailing Facility Area alternatives. The uncertainty in the predicted potential for acid generation of the tailing may also warrant the inclusion of contingencies in remedy selection decisions for contaminated ground water, including an early warning monitoring system for ARD - ML.

14. Ineffectiveness of Ground-Water Withdrawal Wells in Remediating Alluvial Aquifer:

In multiple places throughout the FS Report, CMI suggests that the ground-water withdrawal wells GWW-1, GWW-2 and GWW-3 are effective at reducing the contaminant load from the mine site to the Red River. However, GWW-1, GWW-2, and GWW-3 (as well as the seepage interception systems at Spring 13 and 39) were not specifically designed for remediation of ground-water to achieve New Mexico ground-water standards or federal drinking water standards (preliminary ARARS) (*see also* FS Report, Section 6.1.1.1, page 6-2, first paragraph). Rather, they were constructed to address the EPA National Pollution Discharge Elimination System (NPDES) permit requirements for preventing discharges of pollutants to the Red River from traceable point source mining operations. And for that purpose, those wells are operated to remove pollutants in the alluvial aquifer at select locations near the side drainages of the roadside waste rock piles. They do not remediate contamination in the colluvial and bedrock ground water in those and other side drainages at the mine site, nor at other locations within the alluvial aquifer.

While the ground-water withdrawal wells may be effective in meeting the NPDES permit requirements, the NMED-Ground Water Quality Bureau (GWQB) and EPA Superfund Program do not believe they are effective at reducing contaminant concentrations in the ground water of the alluvial aquifer along the mine site. Both the GWQB and EPA Superfund Program are mandated to remediate contamination to concentrations that meet standards set forth in state and federal regulations, rather than regulate or remediate based on loads or estimated potential loads entering into a river. In reviewing pumping and monitoring data at and in the vicinity of the withdrawal wells, we have observed that the draw downs resulting from pumping at

GWW-1, GWW-2 and GWW-3 are relatively small (in the order of a few feet) and such pumping, although partially effective, is not adequately containing and removing contamination to levels that allow the alluvial ground water to meet those standards. To highlight this point, the following table (Table 1) is provided to show contaminants that exceed New Mexico ground-water standards set forth in Section 20.6.2.3103 NMAC, as well as calculated Reference Upper Tolerance Limits/Upper Predictive Limits (UTLs/UPLs), at several monitoring wells located within the alluvial aquifer down gradient of wells GWW-1, GWW-2 and GWW-3.

TABLE 1

SUMMARY OF EXCEEDANCES OF NM STANDARDS AND REFERENCE UTL/UPLs AT SELECT ALLUVIAL AQUIFER MONITORING WELLS ALONG UPPER MINE SITE REACH OF RED RIVER

	Al	Be	Cd	Co	Fe	Mn	Ni	F	SO4	TDS	pH* (min)
NM Standard	**5.0**	**0.004***	**0.01**	**0.05**	**1.0**	**0.2**	**0.2**	**1.6**	**600**	**1,000**	**6<pH<9**
REF - UTL/UPL	**38.21**	**0.003**	**0.01**	**0.056**	**32.86**	**6.336**	**0.302**	**7.615**	**1,720**	**2,168**	**NC**
Reference Wells (max. conc.)											
Elephant Rock CG-Well 1	ND	ND	ND	ND	ND	ND	ND	0.33	71.7	638	6.9
Lab Well	0.009	ND	ND	ND	0.031	0.006	0.001	0.51	81.7	270	6.8
MMW-17A	12.1	0.005	0.002	0.045	ND	2.03	0.302	13.4	450	952	3.8
MMW-43A	1.6	0.001	0.001	0.009	5.7	3.4	0.022	2.4	2,580	2,200	6.9
SC-7A	39.7	0.006	0.01	0.108	33.7	6.55	0.254	4.5	990	1,890	4.0
SC-8A	ND	ND	ND	ND	ND	ND	0.006	0.49	119	250	6.3
Mine Site Wells											
MMW-10A	XY	XY	XY	XY		XY	XY	XY	X	X	X
MMW-10C	X	X	XY	X		XY	X	XY	X	X	X
MMW-30A	XY	XY	XY	XY		XY	XY	XY	X	X	X
MMW-31A	XY	XY	XY	XY		XY	XY	XY	X	X	X
MMW-32A	XY	XY	XY	XY		XY	XY	XY	X	X	X
MMW-33A	X	XY	XY	XY		XY	XY	XY	X	X	X

Concentrations in mg/L
0.004* = MCL
ND = Not detected above detection limit
NC = Not calculated
TDS* = UTL/UPL not calculated for mine site wells
pH* = UTL/UPL not calculated for reference or mine site wells
XY = Exceeds NM standard and reference UTL/UPL
X = Exceeds NM standard

Table 4.4-3 from the Draft Final RI Report was used for the mine site reference UTL/UPL values.
Table 4.4-4 from the Draft Final RI Report was used for the comparison of mine site well data to the reference well UTL/UPLs.
Concentration data are from the Final Molycorp-Questa Mine Quarterly Database, Ver 16.0, November 2006.

It is noted that there are other inorganic contaminants that are monitored at these wells that are not included in this table.

The water quality data depicted on Table 1 show that the ground water in the mine site alluvial wells continue to exceed the NM standards and federal maximum

contaminant levels (MCLs), as well as the Reference UTLs/UPLs, for the majority of the contaminants (*i.e.,* metals). Based on these monitoring data, it can be inferred that pumping of the withdrawal wells has had minimal effect on improving the alluvial ground-water quality. The discussion regarding reducing loads to the Red River is unrelated to the fact that alluvial ground water, as well as colluvial and bedrock ground waters, at the mine site are contaminated at concentrations that continue to exceed state and federal standards, as well as background levels, regardless of the ongoing pumping. CMI shall include a thorough discussion of the ground-water contaminant concentrations in ground water at the mine site and the ineffectiveness of the NPDES withdrawal wells to significantly reduce those concentrations to levels that meet standards or reference background levels.

Further, in order to effectively remediate ground water to levels which would meet cleanup levels to be established by EPA (*i.e.,* state and federal standards, background levels or health-based levels as preliminary ARARs and TBCs) EPA believes that the ground-water alternatives for the Mine Site Area (Alternatives 3 and 4) must include other viable technologies/process options, in addition to extraction wells, to contain and/or reduce ground-water contamination as close to the mine-caused sources as practicable within the side drainages. The EPA does not believe that the current NPDES ground-water withdrawal system would meet the preliminary ARARs/TBCs or RAOs for the alluvial aquifer, as well as the colluvial and bedrock ground waters (Areas 5, 6, and 7) of the Mine Site Area. Therefore, CMI is directed to propose for detailed analysis other types of ground-water containment or capture systems for contamination sourcing from the roadside rock piles, as well as other waste rock piles, that would be installed at the toe of the piles. Please include such remedy components in both Alternative 3 and 4 for the Mine Site Area.

15. Limit on the Depth of Excavation at the Mill Area:

The assumption that any soil removal in the Mill Area will only be performed to a depth of two (2) feet due to a lack of RI data below this depth is inappropriate. The investigation of soil contamination at the Mill Area, as well as other areas of the Site, only reached a maximum depth of 2 feet to assess risk from exposure to surface soil. After delineating areas of contamination in the upper 2 feet, no further investigatory work was performed. To some extent this was an oversight, since it did not allow determination of the vertical extent of contamination, which is a requirement of the AOC. Hence, the extent of contamination of PCBs and molybdenum in the Mill Area soil below a depth of 2 feet is unknown. In developing and screening cleanup alternatives for the Mill Area, CMI proposed soil removal alternatives that only excavate contaminated soil to a maximum depth of 2 feet, with a visual horizontal indicator to be placed in the bottom of the excavation. In effect, CMI is proposing only partial soil removal alternatives. However, EPA does not consider it appropriate to limit the depth of excavation to 2 feet because of insufficient data, but rather excavation should continue until all contaminated soil above the cleanup levels is removed. CMI shall revise the soil removal alternatives for the Mill Area accordingly. The revision shall include the following approach for the soil removal:

the depth of soil excavation shall initially be 2 feet, followed by confirmatory sampling to verify that the cleanup levels have been attained. If the cleanup levels are not attained, further excavation of contaminated soil will be performed until all cleanup levels are met or EPA determines that a sufficient depth of excavation has been reached. For costing purposes in the FS, the assumption that only the upper 2 feet of soil will be removed is acceptable.

16. Revised Preliminary Remediation Goal for Molybdenum:

    The EPA has revised the risk-based preliminary remediation goal (PRG) for Molybdenum in soil from 54 mg/kg to 300 mg/kg, based on Site-specific toxicity and bioavailability testing of molybdenum disulfide and sodium molybdate in soil to rye grass and earth worms (standard test species). Please revise the areas and volumes of soil requiring cleanup in the alternatives to reflect the new PRG of 300 mg/kg.

17. Spring Gulch Rock Pile Borrow Characteristics:

    In the alternative analysis for Implementability, as it relates to the use of the Spring Gulch Rock Pile as "clean backfill", please include discussions of (1) the distribution and range of concentrations of sulfide minerals (such as pyrite) that can generate acid rock drainage and/or inhibit plant growth, (2) the known presence of elevated molybdenum concentrations and low pH in the Spring Gulch Rock Pile, (3) the range and average of molybdenum concentrations in the Spring Gulch material and how they compare to the EPA's revised risk-based PRG of 300 mg/kg, (4) the need to verify that the fill material to be used from that Pile will have molybdenum concentrations below the 300 mg/kg, and (5) plans to characterize the distribution of high molybdenum (> 300 mg/kg) and sulfide materials within the Spring Gulch pile and segregate it from the suitable borrow.

18. Overall Protection of Human Health and the Environment Analysis:

    In Section 7 – Detailed Analysis of Alternatives, CMI's description of the protectiveness provided to human health and the environment by alternatives that include active remediation is always prioritized first by safety worker practices and BMPs, then CMI's health and safety and hazard communication program, and access restrictions in the short term, followed by the use of ICs in the long term. CMI describes the protection achieved by active response measure(s) of such alternatives as further levels of protection after these other measures (*e.g.,* Analysis of Subalternative 5A, page 7-37). It gives the reader the impression that active remediation is secondary to these other ancillary measures. This is an inappropriate description of these alternatives. First and foremost, the analysis of this criterion must start with the protectiveness provided by the major component of the alternative (*i.e.,* active response measures such as treatment and/or containment of source material or restoration of ground-water to its beneficial uses), not ICs, company health and safety practices or hazard communication programs, or access restrictions. In accordance with the NCP [§300.430 (a)(1)], ICs are to be used to supplement

active response measures such as engineering controls for short- and long-term protectiveness, not the other way around. Therefore, for all the alternatives with active response measures CMI shall rewrite the analyses of Overall Protection of Human Health and the Environment describing the protectiveness of the active response measures first, with ICs and company programs described later, as secondary levels of protectiveness that supplement the active response measures.

19. Compliance with ARARs:

In Section 7 – Detailed Analysis of Alternatives, CMI's analysis of the compliance with ARARs does not include an explanation or rationale when certain ARARs are not expected to be achieved. For example, in Alternatives 2 through 4 for the Mine Site Area, CMI states that federal and state standards for ground water in the alluvial aquifer [MCLs, MCL Goals (MCLGs), and New Mexico Water Quality Control Commission (WQCC) ground-water standards] will not be met for specific constituents. An explanation why certain ARARs cannot be met needs to be provided for such cases. One objective of the FS is to develop alternatives that will meet all ARARs or provide adequate documentation to justify why they cannot be attained (a threshold criterion of CERCLA).

Additionally, for the Mine Site Area alternatives, CMIs only identifies the alluvial aquifer for those ground-water ARARs it expects will not be achieved. There is no discussion of the bedrock or colluvial ground water in the section. If CMI expects such standards would not be met for the colluvial or bedrock ground water, it shall include an explanation for those ground waters also. If CMI expects those ground water standards would be met in colluvial and bedrock ground water, it shall state such expectations in the analysis. Excluding the colluvial and bedrock ground water at the Mine Site Area from the analysis of ARAR compliance is unacceptable.

Finally, for the Mine Site Area, CMI indicates that none of the four alternatives, including the multiple options of Alternatives 3 and 4, are expected to meet the federal and state standards for ground water as ARARs. It is unclear why CMI has such expectations. A significant effort has been made by EPA and New Mexico, in working with CMI, to develop RAOs for the remediation of ground water at the Site and alternatives which will utilize active response measures to achieve the RAOs, including source control measures such as cover and re-vegetation of the waste rock piles that will serve as effective store and release covers to prevent infiltration and acid rock drainage to the maximum extent practicable, as well as ground-water remediation. If CMI does not expect such alternatives to achieve the federal and state ground-water standards for ground water at the Mine Site Area, then CMI must develop other, more robust alternatives that could do so. If it is CMI's opinion that there are no technologies (conventional or innovative) that could achieve the ground water ARARs, it must demonstrate to the satisfaction of EPA that it is technically impracticable to do so, consistent with EPA guidance on technical impracticability. Without such demonstration, there must be other alternatives developed as part of this FS that will be expected to meet all ARARs, including the ground-water ARARs. If

there are alternatives that are not expected to meet ARARs or there is inadequate documentation to support waiving an ARAR for any alternative, they will not be retained in favor of other options that are expected to meet the threshold criterion. Under CERCLA, EPA's selected remedy must be expected to meet all ARARs, or EPA will have to justify invoking a waiver consistent with CERCLA, the NCP, and EPA policy and guidance. Such justification needs to be provided in the FS Report, as supporting documentation for any waiver invoked by EPA in decision-making on the remedy.

20. Use of Revegetation Test Plot Studies and Other Various Studies in the FS:

CMI states in the FS Report that ongoing revegetation test plot studies and other various Site studies and monitoring will be incorporated into several alternatives. The EPA has not approved such studies and monitoring under the CERCLA AOC, or had any involvement in their design and, therefore, disapprove their use in developing FS alternatives or any acknowledgement within the FS Report that alternatives may be modified pending the results of such studies. The EPA had previously suggested to CMI that any such study be incorporated into the AOC as an "Outside Study", where it would be subject to the requirements of the AOC. CMI declined to do so. Therefore, for any study which CMI seeks to incorporate into an alternative, CMI must request in writing that EPA incorporate such study into the AOC as an "Outside Study" pursuant to Paragraph 8 of the AOC. If EPA agrees, CMI must submit the study for review and approval. However, at this late time in the RI/FS process, EPA may decline to allow the use of an Outside Study in developing alternatives. CMI shall delete all statements in the FS Report regarding the use of test plot studies and other various Site studies and monitoring in the development of remedial alternatives, unless specifically directed to do otherwise by comments provided herein.

It is also noted that NMED never approved the design or implementation of the test plot studies under its permitting program, as it had several issues related to the design of those studies.

21. Use of Amendments with Spring Gulch Rock Pile Material:

The EPA has directed CMI to use amendments with the Spring Gulch Rock Pile material in the cover alternatives. However, the information provided in the FS Report on amendments is inadequate. At the end of Section 6.2 there is a brief reference to "typical" application rates for amendments, a self-reference to those used at the Questa demonstration test plots. Based on current literature, higher application rates of the same amendments that are proposed by CMI have been used at other montane mine sites. Successful results depend on adequate application rates and on carefully planned combinations of amendments. In the description of the cover design for individual rock piles (Section 7 – Detailed Analysis of Alternatives), there are no discussions of amendments for the Spring Gulch waste rock pile borrow material.

It is our understanding that BioSol, a commercial organic amendment derived of penicillin production waste, was applied at the demonstration plots in a more typical manner and rate as in other studies. MMD indicated to EPA that BioSol has shown early promise. MMD's experience with BioSol, in more arid environments, suggests an ephemeral effect. Other practitioners have used BioSol with mixed results (Brown, 2009; McGeehan, 2006; others), though MMD is unaware of any BioSol use that demonstrates long-term benefit without periodic reapplication.

There is a large body of published reclamation research that illustrates the benefits of amendment. In one study, the authors acknowledged that "The importance of incorporating OM [*sic* organic matter] into mine spoils to improve nutrient availability and soil physical properties has been well established" (Winter Sydnor and Redente, 2002). In their introduction, Brown et al., 2003 summarize an evolution of reclamation practice to create "manufactured topsoils," with an emphasis on biosolids as a carbon analog. In MMD's view, biosolids, in combination with other amendments, offers the most cost-effective means to achieve successful revegetation and potential for a self-sustaining ecosystem. Studies at other montane, coniferous sites have much in common with the Questa mine site and offer alternatives for amendment combinations and rates, including the Summitville Mine (Winter Sydnor and Redente, 2002), the Climax Mine (Carlson, et al., 2006), at tailings along the Arkansas River near Leadville, Colorado (Brown, et al., 2007) and at Bunker Hill, Idaho (Brown, et al., 2003).

CMI's use of a single reference (Buchanan, 2008) in the FS to suggest a range of amendment options available to CMI is inadequate, especially since EPA does not accept the revegetation test plot studies for development of the cover alternatives without prior review and approval of those studies (*see* previous comment) and has directed CMI to delete the statements on other studies. CMI needs to include discussion of other pertinent studies in developing an appropriate range of amendment options for the FS, including costs and benefits of various combinations.

22. Store and Release Cover for Waste Rock Piles:

CMI has proposed and modeled an evapo-transpiration (store and release) cover. However, in the detailed analysis section for individual waste rock piles there is no discussion on whether a store and release cover will be used. Please describe the store and release cover type and conceptual design being proposed for each waste rock pile. Also, Figure 5-1 needs to be expanded to show the difference between the simple soil cover and the store and release cover.

23. Potential for Metals Uptake in Plants Growing in Waste Rock:

In its March 5, 2008 letter on the Alternatives Evaluation Report, EPA directed CMI to include discussions on the potential for metals uptake in plants growing in waste rock at the mine site. The EPA has concerns that (1) there may be toxicity to herbivores that might consume vegetation containing elevated levels of metals, and

(2) deep rooted perennial species uptake of metals, transported to shoot tissues and eventually shed as annual litter would result in long-term accumulation of metals in surface soil layers. A discussion on metals uptake was not found in the FS Report. Please add a section to the FS Report that discusses this concern, including a review of pertinent literature. Please discuss potential metals uptake from the waste rock as it relates to the long-term effectiveness and performance evaluations. As a related matter, CMI shall also discuss the depth of the proposed store and release cover, as well as the depth of rooting of the vegetation (*e.g.,* trees) proposed to perform transpiration within the cover. Further, please include discussions on the results of the molybdenum toxicity and bioavailability testing performed in 2008 for ryegrass species, as well as the forms of molybdenum found at the Site and their potential for bioavailability, and the revised EPA preliminary remediation goal (PRG) of 300 mg/kg molybdenum in soil.

24. Contingency Plan for Mitigating Exceedances of Ambient Air Quality Standard for Particulate Matter (PM10) at Tailing Facility:

In the FS Report, CMI states that contingency measures will be taken when the short-term National Ambient Air Quality Standard (NAAQS) is exceeded at any one of the existing air monitoring stations at the tailing facility, but no details of the contingency measures are provided. This does not adequately address EPA's June 3, 2008 general comment on dust levels at the tailing facility and the need for a contingency plan. The comment made by EPA on June 3, 2008, is as follows:

> "*After further consideration of the issue associated with dust at the Tailing Facility, including the recent photographs sent to EPA in May 2008 by the Rio Colorado Reclamation Committee (RCRC) of dusty conditions in late March 2008 and the air monitoring data provided by CMI corresponding to the time of that dust event, EPA wants to include with each alternative not only continuous monitoring of Particulate Matter (PM) 10 at select downwind air monitoring stations at the Tailing Facility, but an objective of such monitoring for triggering additional action in the event that PM10 levels exceed a limit or action level. This additional action should be included in the FS alternatives as a contingency plan. Such action may consist of additional dust suppressive measures or modifications to CMI's tailing disposal operations, but it must be something more substantial than current practices to suppress dust. This approach will ensure that the community of Questa will continue to be protected from any unacceptable levels of particulate matter which might migrate off the Tailing Facility during its remaining operational life. The National Ambient Air Quality Standard (NAAQS) for PM10 has been identified by EPA as To Be Considered (TBC) material for providing such level of protectiveness. CMI is directed to add these measures to the revised Alternatives Tables, along with details of a proposed contingency action, and resubmit for EPA review.*"

Please revise the FS Report to include details of the contingency actions that would be taken in the event that the NAAQS PM10 standard is exceeded.

25. Lime Neutralization of Water Used for Pipeline Maintenance:

In several locations within the Detailed Analysis of Alternatives (Section 7), CMI states that *"During periods when the mill is not operating, water is conveyed through the tailing pipeline for maintenance purposes."* Please revise this statement to make clear that the water from the water collection systems uses lime neutralization or pH adjustment, in addition to water from other sources before conveyance through the pipeline for maintenance when the mill is not operating.

26. Consistency of Total Costs:

The text within Section 7.0 presents slightly different costs for alternatives than the cost summaries in Appendix F. In addition, the costs in the detailed backup worksheets (provided to EPA under separate cover) do not match the text in Section 7.0 or the cost summaries in Appendix F. A portion of this inconsistency appears to result from differing rounding methodology. It is important for clarity and consistency that the total costs for alternatives amongst all the sources of information are consistent. Details of specific inconsistencies are detailed in the Specific Comments presented herein.

27. Off-Site Treatment Facilities:

The FS Report should not specify which off-Site treatment and disposal facility shall be used since this might limit the options for selecting such a facility (*i.e.,* if the status of any currently permitted operating facility changes). It is acceptable to identify the availability of off-Site facilities and their distance from the Site for costing purposes, however, the FS Report should remain uncommitted in which facilities shall be used, stating only that they will be appropriate authorized facilities approved by EPA.

28. Ecological Significance:

Based on previous discussions between EPA and CMI during the development and screening phase of the FS, EPA is preparing a draft document entitled: "Ecological Significance". This document will be provided to CMI under separate cover for review and comment. Once finalized, EPA will direct CMI to append it to the FS Report.

29. Section 3 – Summary of Exposure Areas:

a. To help the reader, CMI needs to include a map showing all Exposure Areas in this section.

b. There are a number of requested revisions that would make the section more consistent with the risk assessments for the Site. Risk estimates that include decimal points should be rounded to the next whole number. For example, 1.6 x

10^{-5} should be 2 x 10^{-5}. All discussions of hazard index (HI) are presented as hazard quotient (HQ) for individual contaminants of potential concern (COPCs) without consideration of target organ impacts. Additional discussions are appropriate. Also, discussions of arsenic should include carcinogenic and non-carcinogenic health estimates. Further, all references to "food chain" modeling and model results should be revised to "food web" for clarity. Finally, many descriptions of the HHRA findings are not presented in risk assessment language and can be misleading. However, decisions on which exposure areas (EAs) are carried forward into the FS are correct.

30. Section 4 – Remedial Action Objectives:

One of the RAOs for ground water at the tailing facility and the mine site is to "Restore contaminated ground water to meet state/federal ARARs or preliminary site-specific risk-based cleanup levels for inorganic COCs." In reviewing the FS Report, it is not apparent that the alternatives being developed will achieve the RAOs for ground water by meeting preliminary state and federal ARARs. Based on the CERCLA threshold criterion that remedies meet ARARs, CMI must discuss all the constituents where concentrations exceed state and federal ARARs and how the alternatives will achieve those ARARs. In Section 3, CMI provides detailed information to describe which COCs from the risk assessment are carried forward to the FS Report, but does not include constituents that are not part of the risk assessment but do exceed state or federal water quality standards. An example is sulfate at the tailing facility. New Mexico regulates sulfate and has set a maximum allowable standard for that constituent in ground water. The chemical specific standards set forth in 20.6.2.3103 NMAC have been identified as preliminary ARARs by EPA and must be met.

31. Section 7 – Detailed Analysis of Alternatives:

a. In the evaluation of each alternative in meeting RAOs, please state clearly whether or not the RAO's stated in section 5, will be met and not just that the RAO has been addressed.

b. Throughout Section 7 and within Tables 7-3, 7-5, 7-11 and 7-12 of the FS Report, the New Mexico Waste Water and Water Supply Regulations are incorrectly cited. Revise all references from 20.7.100 NMAC to 20.7.10 NMAC.

32. Terminology:

In accordance with EPA's August 19, 2008 letter to CMI on the draft RI Report (General Comment No. 22.b), please replace the terms "mine rock" and "mine rock piles" with "waste rock" and "waste rock piles" throughout the FS Report. As stated in the August 19, 2008 letter, EPA and the State of New Mexico refer to the overburden spoils that were removed from the open pit during surface mining and dumped into the side-drainages adjacent to the open pit as "waste rock".

Specific Comments:

1. Executive Summary, page ES-1:

    a. The second paragraph regarding future land use shall be deleted or placed within the body of the document. It is inappropriate to include this discussion within the Executive Summary.

    b. Replace the fourth paragraph with the following text:

    "This FS takes into consideration current and reasonably anticipated future land uses, including current and reasonably anticipated future mining operations; closure and reclamation requirements under state water quality and mining programs; and water management activities for state and federal programs."

2. Executive Summary, page ES-2:

    a. In the first paragraph, CMI states: *"Mine planning activities are ongoing and include evaluations of different operating scenarios that could directly impact the implementability of several of the remedial alternatives."* As stated in previous written comments to CMI (General Comment No. 10, October 10, 2007 letter), it is difficult for EPA to select CERCLA response actions based on what CMI may or may not do regarding possible future changing operating scenarios evaluated in planning activities. The EPA will make every effort to consider these issues in its decision-making process, but please recognize that planning evaluations do not lessen EPA's responsibility under CERCLA to protect human health, welfare and the environment. In the event that CMI initiates such changes in its mining activities during the RI/FS, the EPA remedy selection process, or after EPA issues its Record of Decision (ROD), EPA expects that CMI will notify EPA in advance of any decision to change mining activities and the potential interference with CERCLA response actions. The EPA also expects that CMI will conduct those activities in a manner that minimizes interference with CERCLA response actions to the extent practicable, as those actions would be necessary to protect public health or welfare or the environment. Finally, in the event CMI changes its mining operation, EPA might consider modifying a remedy to accommodate CMI's changing operations, if appropriate, and not inconsistent with CERCLA, the NCP and EPA policy and guidance on remedy change.

    b. In the third paragraph, CMI discusses timing of remediation at the Site relative to operational activities. First, these statements are somewhat pre-decisional to EPA remedy selection (*see also* General Comment No. 1, above). The EPA has previously acknowledged to CMI that it is appropriate to consider ongoing and future mining operations as current and anticipated future land uses at the Site in its remedy decision-making. And EPA will do so. As CMI points out, it is

consistent with the NCP and EPA policy and guidance. Further, EPA requested that CMI draft a proposed timeline for conducting CERCLA response actions during mining and post mining as a separate document. The EPA and NMED are currently reviewing the draft timeline. However, any attempt to influence or limit the range of alternatives in EPA's remedy selection process as required in the NCP through such statements in the FS Report is inappropriate.

Second, EPA acknowledges that some statements made by CMI regarding timing of the remedy are appropriate. For example, placement of the cover at the tailing facility is appropriate in those areas of active tailing disposal only after active tailing deposition has ceased. However, for those areas of the tailing facility that are inactive, have been inactive for many years, and/or are not planned for additional tailing disposal, the placement of the cover might be appropriate now. In discussions between CMI, EPA and New Mexico, MMD has indicated its preference for early reclamation where possible, rather than waiting until mining ceases. Further, in light of the recent discussions between EPA and CMI on siting a solar energy pilot study atop a portion of the tailing facility that is inactive, including a cover suitable for such a solar commercial project but one that would meet all EPA CERCLA and state permitting requirements, the statement needs some clarification.

Third, CMI's statement *"…the use of the open pit for remediation must take into account its potential use as a source of ore…"* must be deleted. This issue has been previously been discussed and commented upon in writing by EPA (*see also* General Comment No. 10, October 11, 2007 letter). In developing alternatives for the waste rock piles that EPA consider protective, the options for partial or complete removal of some waste rock piles must include a repository for waste rock. Currently, the only viable repository is the open pit. It is noted that during the Site tour by EPA officials in October 2008, EPA suggested to CMI that it re-examine other potential on-Site repositories such as the subsidence zone. Please revise.

c. In the fourth paragraph, CMI discusses the use of natural resources and energy efficiently in choosing a potential alternative. While EPA fully supports the development of sustainable remedial alternatives and "green" remediation (*see also* General Comment No. 3, above), the objectives mentioned by CMI are not the established specific alternative evaluation criteria required by the NCP or EPA guidance for a CERCLA FS. However, EPA believes that it is a good discussion to include in the Executive Summary, as some of these points may be relatable to established evaluation criteria such as short-term effectiveness or long-term effectiveness and permanence. Please clarify this point or indicate which specific CERCLA criteria are addressed by these types of evaluations. Additionally, to gain perspective on the magnitude of the impact, or reduction of impact, please include quantified baseline hydrocarbon and/or electric consumption details for the ongoing mining, milling, and tailing disposal operations.

3. Section 1.1.1 – Introduction, Disclaimer, page 1-1:

   The initial sentence points out that EPA's RI/FS guidance allows concurrent preparation of the RI and FS documents. The EPA agrees that this is a viable process, and one that has been implemented at other sites. The paragraph goes on to criticize EPA's schedule and process. The EPA is trying to accommodate CMI's recent requests to extend the RI/FS schedule, as well as other stakeholders' requests for extended review times on key documents. The approval of these extended time periods has resulted in several changes to the current schedule. The EPA anticipates that there may be more requests for time extensions. The EPA is also trying to accommodate NMED's original request for accelerating the RI/FS schedule as part of the transfer of lead oversight responsibilities to NMED, which was agreed to and supported by Molycorp at the November 7, 2006 meeting between the Superfund Director of EPA Region 6, the Cabinet Secretary of NMED, and the former Vice President of Molycorp. The EPA acknowledges that its effort to accelerate the schedule in 2006 has resulted in a number of concurrent document preparation processes that do create difficulties, inconsistencies, and inefficiencies. However, EPA believes that these issues were minimal. The EPA also believes that the RI and Risk Assessment (RA) were at sufficient stages of completion to move the process forward into the FS with limited difficulties. The EPA further believes that the FS Report, once final, shall be consistent with the findings of the final RI Report and RA, and that the completed RI/FS shall be consistent with CERCLA, the NCP, and EPA policy and guidance. Therefore, EPA considers the Disclaimer section to be unwarranted. If CMI believes that the mutually agreed upon efforts to accelerate the completion of the RI/FS and decision-making process are inconsistent with CERCLA and the NCP, CMI can elevate this dispute in accordance with the Section XX of the AOC. *See also* General Comment No. 1, above.

4. Section 1.2.1 – Introduction, Site Description, page, 1-2:

   Please include Eagle Rock Lake as an area that was included in the RI/FS.

5. Section 1.2.1.1 – Introduction, Mine Site, page 1-3:

   In the first full paragraph CMI lists only two of the surface water designated uses for the Red River as defined by 20.6.4.122 NMAC. Please list all the designated uses for this stretch of the Red River.

6. Section 1.2.1.1 – Introduction, Mine Site, page 1-3:

   In the second full paragraph, CMI discusses the mine site without any mention of current and past landfills and explosive storage areas. Revise this paragraph to describe all current and past landfills and explosive storage areas. Also add Discharge Permits DP-1055 and DP-1539 to text in this paragraph.

7. Section 1.2.1.2 – Introduction, Tailings Facility, page 1-3:

   Please include a statement indicating that the tailing impoundments are unlined and that NMED Discharge Permit DP-933 regulates discharges from the facility that have potential to impact the underlying aquifer. Also, for further clarification, include a figure that identifies the locations of all the historic and present dams at the tailing facility as discussed in the text of this section.

8. Section 1.2.1.2 – page 1-4, 3rd bullet:

   a. It is not clear whether Dam 3 was accidentally or intentionally breached, and if intentional, why the dam was breached. Please clarify.

   b. The bulleted items describing Dam 5A and the decant pond are misleading. The first bullet implies that the area has been "filled and capped" and is no longer in use. The description should also state that; while this area does not receive active tailing placement, it is used for water storage. The second bullet implies that the temporary storage provides containment. In the description, please indicate that most of the water placed at the tailing facility is discharging uncontrolled to ground water from these two areas. Also include the first full paragraph on page 6-7 in this introductory section for the tailings facility.

9. Section 1.2.3 – Introduction, BHHRA and BERA, page 1-6:

   The last sentence is misleading and needs to be revised to reflect that the Draft Final BHHRA and BERA were available at the time the alternatives for the FS Report were being developed to address risk at the Site. *See also* Specific Comment No. 3, above.

10. Section 1.4 – Introduction, Future Operations Scenarios and Land Use:

    It is our understanding that the New Mexico Office of the State Engineer (State Engineer) has granted well drilling and water use restrictions at other contaminated sites only for the period of time while active remediation is on going. However, we anticipate that ground water extraction and treatment will be needed at this Site for many years (possibly in perpetuity) and we are unaware whether the State Engineer has ever made such restrictions permanent. CMI must address this issue directly with the State Engineer and provide details in this section on whether or not permanent well drilling/water use restrictions would be considered by the State Engineer.

11. Section 2 – Preliminary ARARs, page 2-4:

    The first full paragraph states *"The process for determining Point of Compliance under New Mexico Laws is uncertain."* The State of New Mexico does not have a process for determining "Point of Compliance" as stated in this sentence. Under New Mexico regulations all ground water regulated by 20.6.2 NMAC is protectable at any place of withdrawal for present or reasonably foreseeable future use. The EPA is

currently reviewing the issue of Point of Compliance raised by CMI in letters to EPA from a CERCLA perspective and will comment on this issue under separate cover. Please delete this sentence.

12. Section 2.4 – TBCs, page 2-8, footnote 1:

    It is EPA's role to determine if and how TBCs are to be used in a remedial action. CMI shall delete the footnote from page 2-8 and the one at the end of Table 2-1, page 24.

13. Section 2, Table 2-1 – Preliminary Federal and State ARARs and TBCs:

    a. Please change the title of this table to *"....Received on April 3, 2008"*. Also insert a footnote that states an updated and edited version of Table 2-1 was also received from EPA on July 30, 2008.

    b. On page 14 of 24 of Table 2-1, EPA and NMED erroneously identified the New Mexico Mining Act as both Applicable and Relevant and Appropriate. It has been determined that the entire law is not applicable and, therefore, the law is instead relevant and appropriate. Please modify the "Type" column under the New Mexico Mining Act to read: *"Relevant and Appropriate"*. This comment also applies to Table G-9 (page 4 of 6) in Appendix G.

14. Section 3.1 – Exposure Areas, page 3-1, first paragraph:

    In the final sentence, please revise the statement *"...the uncertainty in the calculated risk values..."* to *"...the evaluation of uncertainties associated with risk estimates..."*

15. Section 3.1 – Exposure Areas, page 3-1, second paragraph:

    The second bullet simplifies the actual method used to evaluate background. The method used was a seven-step method as described in Selecting Inorganic Constituents as Chemicals of Potential Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities (DTSC, February 1997). Included in these seven steps are rigorous statistical evaluations. Please revise.

16. Section 3.1 – Exposure Areas, page 3-1, second paragraph:

    An important method to include in this bullet list is that risk assessments compared Site exposure area risks to "background" or reference exposure area risks in the assessment of background. Please include this comparison.

17. Section 3.2 – Areas for Evaluation in the FS, page 3-4:

    The fifth sentence references "ecological relevance". Instead, this sentence should read, "…based on several factors, including magnitude of hazard quotients (risk

estimates), size of area of concern, and significance of risk estimates (relative to population level impacts)." Please modify.

18. Section 3.3.1 – Soil Exposure Areas, page 3-5, second paragraph:

    a. The first bullet states, *"All receptors at EA-4 were estimated to have less than 10^{-5} cancer risk from direct contact/ingestion of arsenic."* Please modify this sentence to read "All receptors at EA-1 were estimated to have less than or equal to 10^{-5} cancer risk associated with exposure to arsenic in surface soil."

    b. The last sentence of the third bullet is confusing. *"For exposure to arsenic in a hypothetical future residential scenario, the HQ was 0.19 but the EPC was greater than the PRG."* Please modify this sentence to read "*The PRG for arsenic based on a residential scenario and a target cancer risk of 10^{-5} is 5.0 mg/kg. The PRG based on adverse non-cancer health effects is 28 mg/kg for residential exposure to arsenic in soil. The surface soil EPC for EA-1 is 5.63 mg/kg, which is slightly higher than the PRG based on cancer risk but significantly below the PRG based on non-cancer health effects."*

19. Section 3.3.1 – Soil Exposure Areas, page 3-5:

    The first sentence of the fourth paragraph (Soil EA-2) states *"...did not contain sufficient ecological habitat...."* This should be revised to *"...did not contain suitable ecological habitat...."* Please modify.

20. Section 3.3.1 – Soil Exposure Areas, page 3-7, second bullet:

    The bullet states that evaluations were not "quantitative". Please note that exposures to Site related contamination in EA-3 for construction workers were quantitatively evaluated in the BHHRA. Please refer to Table B-7.69 and modify the discussion accordingly.

21. Section 3.3.1 – Soil Exposure Areas, page 3-8, first paragraph:

    The discussion of EA-4 limits the scenarios evaluated for human health. Exposures to Site-related contamination in EA-4 for commercial/industrial workers and construction workers were also quantitatively evaluated in the BHHRA. Refer to Tables B-7.75 and B-7.76, respectively. Please modify the discussion.

22. Section 3.3.1 – Soil Exposure Areas, page 3-8, third bullet:

    The meaning of this bullet is unclear; it is assumed the bullet refers to the residential scenario stating *"Exposure to all other COPCs had a cancer risk less than 10^{-5} and a non-cancer risk HQ less than 1.0."* Arsenic is the only carcinogen detected in EA-4. HQs for individual COPCs were less than 1 for residents. Please clarify the discussion.

23. Section 3.3.1 – Soil Exposure Areas, page 3-9:

a. The first dashed statement references copper. It may be worth noting that copper is an essential nutrient and, therefore, some uptake in animals is expected and healthy. Please clarify.

b. First full paragraph: The last sentence states, *"Potential ecological risk is small and is likely to be within the uncertainty of the TRVs used to develop these risk values."* This sentence will not be clear to most readers. It should be revised as follows: *"This is largely the result of uncertainty in TRVs and associated risk estimates and, therefore, a low likelihood of population or community level effects."* Please modify.

c. Final full paragraph: This paragraph is incorrect and should read: *"The HHRA concluded that arsenic, iron, and molybdenum contribute to risk and hazards in EA-5. For residents, iron contributes about 40% of the total HI while molybdenum contributes about 30% of the total HI. HIs for individual COPCs are less than 1; HIs for target organs are at 1 (e.g., HI =1.3)."* Please modify.

d. The final bullet states, *"Exposure of all receptors to arsenic or iron was estimated to produce a potential cancer risk less than 10^{-5} and a non-cancer risk HQ less than 1.0 for both arsenic and iron in riparian soils."* The sentence should be modified to read: *"Cancer risk associated with exposure to arsenic in soil in EA-5 was 10^{-5} or less for all receptors. HIs were less than 1 for all COPCs for all receptors. Total HI for residents was slightly above 1; however, HI for target organs was 1 or below."* Please modify.

24. Section 3.3.1 – Soil Exposure Areas, page 3-10:

The last sentence in the bullet from page 3-9 is incorrect. Arsenic was the only carcinogen evaluated for EA-5; therefore, the statement that risk associated with exposure to all other COPCs was estimated at less than 10^{-5} should be deleted. Please modify.

25. Section 3.3.1 – Soil Exposure Areas, page 3-10:

a. The second bullet should discuss PRGs for human health, not ecological PRGs. The EPC for arsenic in EA-5 is slightly above the PRG based on 10^{-5} cancer risk for residents. Please modify.

b. The statement in the third bullet *"that the risk assessment report indicated that the EPCs for all COPCs were less than background?"* is incorrect. Arsenic, iron, and vanadium EPCs are at background levels in EA-5; however, the molybdenum EPC for EA-5 is an order of magnitude higher than background. The HI associated with exposure to molybdenum in EA-5 is below 1, which supports the

conclusion that EA-5 need not be evaluated based on human health concerns. Please modify the discussion.

26. Section 3.3.1 – Soil Exposure Areas, page 3-12:

    a. Some statements made in the first bullet are incorrect. Risk is not de minimus for future residents or commercial/industrial workers. Note arsenic is the only carcinogen evaluated in EA-6. EPA suggests that CMI reword this bullet to read: *"Cancer risk associated with exposure to arsenic in surface soil in EA-6 for all receptors is less than 10^{-5}. HIs for all receptors are equal to or below 1."* Please modify.

    b. The statement in the third bullet *"that the risk assessment report indicated that the EPCs for all COPCs were less than background?"* is incorrect. However EPCs are less than PRGs. Please clarify.

27. Section 3.3.1 – Soil Exposure Areas, page 3-14:

    a. The seventh bullet of the second paragraph (ecological receptors) that presents results for ingestion of homegrown produce should be moved to the human health section above. Please modify.

    b. Please include an additional bullet to the human health section that presents the results of ingestion of home raised meat and milk exposure pathways.

28. Section 3.3.1 – Soil Exposure Areas, page 3-15:

    a. The first paragraph incorrectly states *"EA-8 was evaluated only for human health risk based on the decision in the risk assessment that potential ecological risk be evaluated in Soil EA-9, of which EA-8 is a sub-area."* Instead, EA-8 was selected as a unique exposure area based on land use, data results, and human receptor behavior. EA-8 was expanded to include additional areas to form EA-9 for the BERA based upon ecological receptor behavior. Please modify this discussion.

    b. The second bullet states, *"Non-cancer HQs due to direct contact/ingestion of iron and molybdenum were less than 1.0 for all exposure scenarios."* This should be modified to read: *"HIs associated with exposure to COPCs in surface soil for all receptors are equal to or below 1. Note the total HI includes exposure to arsenic, iron and molybdenum and that dermal contact is estimated for arsenic but not iron and molybdenum."* Please modify.

    c. The fourth bullet is incorrect. The HHRA concluded that arsenic concentrations were slightly higher than the reference area. Please modify the discussion for arsenic.

29. Section 3.3.2 – Surface Water Exposure Areas, page 3-16:

The first paragraph should mention that the recreational visitor scenario assumed that this receptor lived in the area and visited surface water exposure areas frequently. Please modify.

30. Section 3.3.2 – Surface Water Exposure Areas, page 3-17:

The second bullet of the first paragraph refers to impacts attributable to "reference". For clarity, the sentence should be modified to refer to "upgradient sources". Please clarify.

31. Section 3.3.2 – Surface Water Exposure Areas, page 3-18:

The first bullet under Eagle Rock Lake suggests multiple carcinogens. Arsenic is the only carcinogen evaluated for this exposure area. Please modify.

32. Section 3.3.2 – Surface Water Exposure Areas, page 3-19:

a. The first paragraph describes impacts to Eagle Rock Lake from Red River water quality. This discussion should be expanded to include impacted sediment flowing into the lake, as well. Please clarify.

b. First bullet under storm water catchments and second bullet under seepage catchments (page 3-20); these bullets should discuss target organs when total HI is greater than 1. Please modify.

33. Section 3.3.2 – Mine Site Storm Catchments, page 3-19:

The third bullet from the top that starts with "*The number of days…"* CMI claims that water within the catchment is held far fewer than 88 days. Please provide supporting documentation (records) to verify this is accurate and that it will remain so even after cessation mining. CMI goes on to state that this water infiltrates within a few days. CMI needs to be aware that if the water contains constituents above state standards for either ground water or surface water, in the case of a catchment after cessation of mining, CMI will be required to line the catchment to prevent such infiltration.

34. Section 3.3.2 – Surface Water Exposure Areas, page 3-21:

The second full paragraph should mention that while catchments do not support trout, those that hold water for longer durations can be wildlife attractants and can adversely affect wildlife that use or drink from these waters. Therefore, minimizing standing water in these catchments is important. Please modify.

35. Section 3.3.2 – Surface Water Exposure Areas, page 3-23:

    The last sentence of the fourth paragraph states: *"...could lead to potentially unacceptable risk levels."* This sentence should be modified to *"...could lead to adverse effects in trout."* Please modify.

36. Section 3.3.3 – Mine Site Storm Catchments, page 3-25:

    In the second bullet from the top of the page CMI states: *"This intermittent toxicity is not clearly related to mining operations or on-site sources."* Please revise this sentence to state "*It is unclear whether this intermittent toxicity is related to mining operations or on-site sources."*

37. Section 3.3.4.2 – Comparison to State Standards, page 3-32:

    Please include the entire section of 20.6.2.3103 NMAC, so that the reader will have the complete context of the regulation.

38. Section 3.3.4.3 – Bedrock-10, Western Mine Boundary, page 3-35:

    Based on what is stated in this paragraph, there is no justification to conclude that the impacted bedrock ground water in this area is not related to contamination originating from the Capulin Waste Rock Pile. Revise the second to last sentence to read: *"Although this area is to be included for evaluation in the FS, it is unknown whether the elevated concentrations and associated human health risk are mine-related."*

39. Section 3.3.4.3 – Tailing Facility, page 3-36:

    Please delete the superscript for Upper Alluvial Aquifer-3 (Lower Sump). This area is not within the tailings facility boundary and the stratigraphy is unknown.

40. Section 3.3.4.3. – Tailing Facility... page 3-36:

    Based on geologic borehole data from the recent drilling of monitoring wells MW-35 and MW-36, there is no clear evidence that there are distinct Upper and Basal Alluvial Aquifers beneath the tailing facility. The Upper and Basal Aquifers should be described as one contiguous aquifer with localized clay lenses. The EPA and NMED provided similar comments to CMI in their letter on the draft RI Report.

41. Section 3.3.4.3 – Tailing Facility, Basal Bedrock Aquifer-4, page 3-37:

    Some further explanation is required in this section. Specifically, how can the wells within the area be statistically greater than reference and the median EPC is also greater than the PRG, yet the risk are similar to reference risk? Please explain or revise the statements accordingly.

42. Section 3 – Summary of Exposure Areas, Figure 3-2:

a. This figure presents the ground-water exposure areas at the tailing facility, which appears as agreed upon by EPA. However, there are two minor Spring-location issues that require clarification or modification. First, the location of "Source Area for Spring 18" label. This is the first time that EPA and NMED have seen this feature located on a map. The location is described in Section 3 of the Draft Final RI Report (page 3-46 of 3-147), but it is not located on either of the Draft Final RI figures of the tailing facility (Figure 3.5-44 or 3.5-51). As presented in Figure 3-2, the Spring 18 Source appears to be located on the south side of the Red River. However, the source spring is more likely located on the north side of the Red River. Please confirm the location of the "Source Area for Spring 18" label, and revise if necessary.

b. In addition, this figure will benefit from the addition of a "Source Area for Spring 17" label near the 002 Outfall. This label has been included on other maps and would provide clarification for this figure, as the Spring 17 and 18 labels are actually an "end of the pipe" location, rather than an actual spring issuance location.

43. Section 4.1 – Remedial Action Objectives, page 4-2:

In this section, CMI includes discussions on the temporal aspects of any CERCLA response actions as they may relate to the Site being an operating mine. CMI further discusses the role that land use and anticipated future land use play in the RI/FS and its opinion of what EPA must do regarding land use and temporal structure in any future decision-making (*see also* General Comment No. 1, above). The EPA recognizes the complexities in conducting CERCLA response actions at a Site where mining and mining-related operations are ongoing and has met with CMI and NMED several times to discuss these complexities and how best to proceed. The EPA has indicated to CMI and NMED that the operational status of the mining activities, as a current land use, will be taken into full consideration in its decision-making, consistent with the NCP, and EPA policy and guidance. The EPA also believes that for current and anticipated future land uses, every stage of the RI/FS and baseline risk assessment performed to date have been consistent with the NCP, EPA policy and guidance, including the development of remedial alternatives that consider several reasonably likely post-mining land use scenarios. However, it should be noted that EPA will determine what the reasonable anticipated future land use is for the Site in its decision-making process based on all available land-use information. It is also noted that the anticipated future land use is still a point of contention between EPA/NMED and CMI, as the permanency of CMI's proposed ICs on land use, including the conservation easement and restrictive covenants for conveying rights and possible interest in real property to the local government (as the Grantee) and third party beneficiaries, continues to be discussed (*see also* General Comment No. 5, above).

Additionally, in the first full paragraph on page 4-2, CMI's statements on suggestions made about the ongoing mining operations not being a legitimate basis for remedy selection indicate to EPA that such suggestions to CMI were taken out of context. Please delete the statements. As stated above, EPA shall consider CMI's operation status in its decision-making.

44. Section 4.1.1.2 – Mill Area, Future Land Use, page 4-4:

In the statements regarding reasonably anticipated future land use for the Mill Area, CMI writes *"... the probability that the area (Mill Area) will support residential use is low"*. The EPA and NMED disagree with the statement, since the area in question is relatively level, has easy access to the highway and is located in a scenic mountain valley where there are popular outdoor winter and summer recreational activities. It is expected that these qualities would make it one of the more desirable future residential areas at the Site. In fact, the Red River Valley near the mine site has been used for residential dwellings in the recent past (*e.g.,* Cabin Springs area) and there are an ever-increasing number of homes being built along the valley and mountain side near the town of Red River. The EPA and NMED have discussed these aspects of the mill area and its potential future land uses with CMI at previous RI/FS meetings in 2008. Our position now, as it was then, is that after mining ceases and remediation is completed, the probability that this area will support a residential use is fairly high. Please revise or delete the sentence accordingly.

45. Section 4.1.2.1.1 – Mine Site Drainages and Rock Piles, pages 4-4 through 4-7:

The description of the acid generating potential of the individual waste rock piles in the second paragraph is vague and inadequate. The description for the Spring Gulch Waste Rock Pile states that *" ...the other rock piles are sources of metals and acidity..."* Include a discussion on the acid generating potential for each waste rock pile; making it clear, concise, and more apparent to the reader what the current conditions are.

46. Section 4.1.2.1.2 – Mine Site Area, Open Pit and Subsidence Zone, page 4-8:

CMI states in the last paragraph, "*No risks have been estimated for the water in the open pit"*. Please expand upon this statement and discuss why the risk for the surface water in the open pit was not evaluated. Even though the risk was not estimated, please include in the discussion the acidic nature and heavy metal concentrations of this water. A description of what happens to the water in the open pit should also be included.

47. Section 4.1.2.1.4 – Mine Site Area, Ground Water, page 4-9:

a. CMI makes the following statements in this section: *"The colluvial water-bearing unit, because it is low-yielding does not produce usable quantities of water, due to*

the limited extent of saturation (horizontal vertical) and low permeability." and *"...the colluvial and bedrock units do not have sufficient transmissivity to supply economic quantities of water to wells, springs, or other points of practicable usability."* The determination what is or is not usable ground water, as defined by 20.6.2.7.Z NMAC, will be made by NMED. To date, a demonstration that the colluvial water-bearing units do not provide a usable quantity of water has not been made. Please delete all references to such statements in the FS Report.

b. In the second paragraph, the description on how the seepage from Goathill Gulch drainage is being collected and routed to the subsidence zone needs to be expanded upon. Please describe that there is no collection system in Goathill Gulch and that all the seepage flows in open-unlined channels in Goathill Gulch. Also specify that water collected from the Capulin Waste Rock Pile is routed to Goathill Gulch through the borehole and also flows down unlined channels to the subsidence zone. This comment is also relevant for Section 4.1.2.1.6, Mine Site Rock Pile Seepage on page 4-10.

c. In the second paragraph, please state the purpose of the extraction wells being described in the last two sentences (*i.e.,* to meet EPA's National Pollution Discharge Elimination System (NPDES) permit requirement for preventing the seeps and springs along the mine site from entering the Red River. *See also* General Comment No. 14, above.

48. Section 4.1.2.1.6 – Mine Site Rock Pile Seepage... page 4-10:

a. CMI states *"Seepage is collected in sumps that gravity-drain to a horizontal borehole and discharges into the Goathill Gulch drainage."* *See also* Specific Comment 47.b, above.

b. Please add text describing that the existing configuration of the seepage collection system only allows a limited volume of water that collects in the collection sumps to "gravity drain" to the horizontal borehole. As a result, there is a pond called the Pumpback Pond below this gravity drain point to collect seepage.

49. Section 4.1.2.1.7 – Mine Site Seepage Catchments, Ground Water, page 4-10:

Revise to state that the mine related impacted water from the Capulin Waste Rock Pile is directed through the borehole to Goathill Gulch and flows in an unlined channel to the subsidence zone.

50. Section 4.1.2.3 – Mine Site Area, RAOs, page 4-11:

One of the RAOs for the mine site is "*Eliminate or reduce, to the maximum extent practicable, leaching and migration of inorganic COCs and acidity from mine rock (acid rock drainage) to groundwater at concentrations exceeding ground-water ARARs or preliminary site-specific risk-based cleanup levels*." It has been

determined that this RAO shall be rewritten to better reflect the ground water regulatory requirements outline in the New Mexico Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC. Please revise the mine site RAO listed above to, "*Eliminate or reduce, to the maximum extent practicable, leaching and migration of inorganic COCs and acidity from mine waste rock (acid rock drainage) to ground water at concentrations and quantities that have the potential to cause exceedances of the numerical ground water ARARs or preliminary Site-specific risk-based cleanup levels*."

51. Section 4.1.2.3 – Mine Site Area, page 4-13:

Delete Superscript 3 and the corresponding footnote. The EPA will determine the timing and implementation of such alternatives or components of alternatives in the decision-making process to address Remedial Action Objectives for the Site.

52. Section 4.1.3.3 – Tailing Facility Area, RAOs, page 4-15:

One of the RAOs for the tailing facility is "*Eliminate or reduce, to the maximum extent practicable, the seeping and migration of inorganic COCs from tailing to groundwater at concentrations exceeding state/federal ARARs or preliminary site-specific risk-based cleanup levels for groundwater*." It has been determined that this RAO shall be rewritten to better reflect the ground water regulatory requirements outline in the New Mexico Water Quality Control Commission (WQCC) Regulations 20.6.2 NMAC. Please revise the tailing facility RAO listed above to, "*Eliminate or reduce, to the maximum extent practicable, the seeping and migration of inorganic COCs from tailing to groundwater at concentrations and quantities that have the potential to cause exceedances of the numerical ground water ARARs or preliminary Site-specific risk-based cleanup levels for groundwater.*"

53. Section 4.1.4.2 – Red River Riparian and South of Tailing Facility Area, page 4-17

One of the current land use scenarios for this area is unrestricted residential land use. EPA directs CMI to develop alternatives that meet the RAOs for this area and as-well-as alternatives for this area that would result in unrestricted future land use.

54. Section 4.2 – Preliminary Site Specific Risk-Based Remediation Goals, page 4-19

The last sentence states "*Because of uncertainty in the TRV for molybdenum and concerns about bioavailability, additional bioassay and bioaccessibility studies are in progress and may be used in developing a revised cleanup level."* Please add that these additional studies have been used by EPA to revise the preliminary remediation goal (PRG) from 54 mg/kg to 300 mg/kg for molybdenum in soil for protection of terrestrial receptors. In addition, state that, based on subsequent review of the Site specific risk-based PRG of 11 mg/kg for molybdenum in soil for the protection of livestock; EPA has determined that this PRG will remain the same. Please delete all

references in the FS Report that assert that the 11 mg/kg PRG may be revised. This includes the footnote on Table 4-32 for molybdenum exposure to grazing livestock.

55. Section 4, Figure 4-1:

    a. The labeling of Blind Gulch and Sulphur Gulch North for this figure is different than other figures in the RI and FS. Also, the truck shop slice area and a green line in the open pit appear different in this figure than RI figures. For example, see Draft Final RI Report Figure 2.4-1. Please revise for consistency.

    b. Figure 4-1 includes a line delineating the extent of subsidence in a post-mining closeout condition. The delineation is a modeling interpretation (i.e., projection) from CMI's Closure/Closeout Plan for Subsidence Areas (December 2004) and is termed the "zone of relaxation" where 1 to 10 feet of deformation is predicted. This zone of relaxation is between the Primary Subsidence Area (greater than 10 feet of subsidence) and the Zone of Deformation (less than 1 foot of subsidence). The EPA agrees that this area is important because of its potential impact on remediation and surface runoff. Additionally, the Primary Subsidence Area may be an important aspect in FS evaluations. Please include the predicted boundary of the Primary Subsidence Area on Figure 4-1 and specify the defined ranges of predicted subsidence in a footnote.

56. Section 5.1.3.1 – Grading of Existing Surface, page 5-3:

    Please clarify how regrading surfaces reduces leaching of soluble constituents.

57. Section 5.1.3.1 – Simple Soil Cover/Cap... page 5-4:

    The statement that the typical thickness of a simple soil cover is 12 to 24 inches is not quite accurate. Many simple soil covers at hard rock mine sites, including monolithic soil covers, have minimum thicknesses of three feet. Some examples include:

    - 3 to 4.5 feet of monolithic cover at the Rocky Mountain Arsenal in Colorado;
    - 3 feet of uncompacted till over approximately 10 inches of compacted waste rock at the Cluff Lake Mine, Sackatchewan;
    - Over 3 feet of overburden and about 5 inches of topsoil at the Carbon No. 2 Mine in New Mexico;
    - 3 to 4 feet of cover at the Wostar Coal mine in British Columbia;
    - 3 feet of cover at the Cannon Mine in Washington;
    - 7.5 feet of cover at the Equity Silver Mine in British Columbia;
    - Over 3 feet of soil over approximately 7 inches of compacted waste at the Whistle Mine in Ontario; and
    - Approximately 3.5 feet of cover at the Golden Sunlight Mine in Montana.

The thickness of the cover depends somewhat on the cover's performance objective. Please revise the statement to read that the thickness of simple soil covers at hard rock mines sites can vary depending on its performance objective.

58. Section 5.1.3.1 – Covers... pages 5-4 through 5-11:

Please include a bullet indicating that regular cover maintenance is required. This should be included for each type of cover system.

59. Section 5.1.3.1 – Horizontal Barriers - Store and Release Cover (ET), page 5-9:

a. The following statements are made in this section: "*The main difference is in the use of multiple layers that are constructed to provide protection from erosion, root penetration, and animal burrowing or to provide a capillary break (barrier). The construction of this cover is similar to the monolithic store and release cover. The introduction of the capillary barrier serves…"* Multiple layer covers are also used to provide a drainage layer between the cover and the material being isolated. Insert the phrase *"or a drainage layer"* after the words capillary barrier as another reason why multiple layers covers are constructed.

b. Capillary barriers beneath growth layers are rarely part of current multilayer store and release cover designs. While capillary barriers have been shown to act as a barrier in modeling and column-scale tests, they have been shown to be ineffective in field-scale tests at mine sites in semi-arid climates (*see also* Gee. G.W., W.H. Albright, and C.H. Benson, 2006; Comment on "Evaluation of evapotranspirative covers for waste containment in arid and semiarid regions in the southwestern USA", Vadose Zone J. 5:809-812). However, compacted layers beneath growth layers are becoming the more common due to their demonstrated effectiveness and ease of construction. A compacted waste layer or a thin soil layer beneath the growth layer provides a drainage interface for water that is not held within the growth layer.

60. Section 5.3.2.1 – Soil/Mine Rock: EA3 (Multilayer Store and Release Cover), page 5-22 and page 5-23:

In the last paragraph on page 5-22, CMI states: *"The multilayer store and release cover was eliminated from further consideration for the following reasons:*

- *Construction of the capillary barrier is limited to shallow slopes due to the reduced interface friction between the capillary barrier material and soil components of the cover and the underlying mine rock, which cause cover instability.*

- *The multilayer cover could not be constructed using conventional construction techniques due to the placement of material on steep slopes; unique placement methods must be employed to construct the cover."*

As discussed in the previous comment, above, a multi-layered cover can also be constructed with a compacted layer between the waste material and the growth material. The compaction layer may be comprised of waste rock or compacted cover materials below the minimal 3-foot thick cover. It is noted that the construction of a compacted layer beneath the growth media for all waste rock and tailing surfaces on all slopes less than 2H:1V, including benches and top surfaces, may be required during remedial design for surface prepping prior to placement of cover regardless of the cover alternative selected. The EPA has directed CMI to target regrades for waste rock piles at slopes no steeper than 3H:1V (*see also* General Comment No. 6, above).

61. Section 5.3.2.1 – Soil/Mine Rock: EA-3, page 5-24:

    a. CMI shall remove the first two full sentences on page 5-24 that begin with "*Although excavation…"* The EPA and NMED do not believe that removing the waste rock piles are technically more difficult than any other mining operation or pose any greater risk to workers than the existing underground mining operation. The excavation and removal of waste rock is implementable with advanced planning, proper equipment, and safe construction practices during remedial action to address worker safety concerns.

    b. In the last sentence of the first paragraph at the top of page 5-24, CMI states: *"Furthermore, in instances where hydrothermal scar underlie rock piles …removal of the mine rock exposes the scar material and allows for leaching of metals."* This statement implies that scars covered by the waste rock do not leach metals to ground water and, indirectly to, surface water. This contradicts CMI's interpretation and conceptual model on the sources of impacts to ground water and surface water at the mine site in the draft final RI Report. It also contradicts CMI's interpretation of the effectiveness of the ground water extraction alternatives within this FS Report, as CMI indicates that such options will remove load by natural scar material. The statement is misleading. Please delete it.

62. Section 5.3.2.2 – Surface Water, page 5-24:

    a. In the third paragraph, please revise the statements that extraction wells and interceptor trenches reduce seepage to that they reduce the amount of seepage that enters the Red River.

    b. Based on the last sentence of the third paragraph, it appears that CMI has screened out slurry walls during the process option selection phase. While other technologies may have been chosen as representative process options, slurry walls were not screened out. According to Appendix B, table B-9, slurry walls were retained as a viable technology. CMI needs to rewrite this last sentence to describe that while slurry walls were not selected as the representative technology for alternative design, slurry walls are containment technologies that are technically feasible.

63. Section 5.3.2.3– Ground Water, Colluvium-5, 6 and 7, page 5-27:

In the first full paragraph CMI discusses the use of slurry walls, grout curtains, trenches, and their usefulness. CMI states: *"These technologies are suitable for sites where ground water is generally less than 30 feet, are difficult to construct, and become less effective at greater depths. The depth to colluvial water ranges from 100 feet to as much as 400 feet in these areas of the mine site and these containment technologies are difficult to construct at these depths."* However, the depth to colluvial water below the pumpback pond in Capulin Canyon is less than nine feet below the ground surface. This is a "suitable" location for a cut-off wall that is keyed into bedrock. Such a structure, in coordination with a shallow extraction well, would prevent further contamination of the waters in the reach between the pond and the Red River. Therefore, EPA and NMED disagree with the CMI assessment that these technologies would not be effective at intercepting contaminated ground water from colluvium in Areas 5, 6 and 7. Please rewrite this section explaining that numerous containment technologies, including slurry walls, cut-off walls, grout curtains and trenches, are viable technologies to capture ground water in colluvial areas and at the toe of waste rock piles. Additionally, CMI has not adequately justified its proposed technology choice of extraction wells. CMI indicates that extraction wells may not be effective in colluvium having a low transmissivity and limited extent of saturation. Per EPA RI/FS guidance, the representative process option (*i.e.,* extraction well) is first screened for technical implementability to determine it can be effective at the Site to achieve the general response action (*i.e.,* collection/containment) and then further screened for effectiveness, implementability, and cost. It appears that CMI has determined that its chosen representative process option may not be technically implementable or effective at containing contaminated ground water in colluvium and bedrock in side drainages at or near the toe of waste rock piles. Therefore, CMI needs to choose one of these other containment process options for the development of alternatives. CMI should also consider such process options in combination with an extraction well, as appropriate.

64. Section 5.3.2.3 – Ground Water, Bedrock -5 and 6, page 5-28:

In the FS Document, CMI disregards all ground-water capture technologies except well extraction. Yet, CMI indicates that extraction wells may not be effective because of very low yields. CMI has not adequately justified its proposed representative process option choice and, therefore, needs to choose a different representative process option for the remedial technology of vertical barriers. As addressed in the previous comment above, and as CMI stated in paragraph 3, interceptor trenches/grout curtains and slurry walls all have medium to high effectiveness and are technically feasible. CMI should also consider such containment process options in combination with extraction wells, as appropriate.

65. Section 5.3.3.1 – Soil: EA-7 (Tailing Facility), page 5-30:

In the third paragraph CMI states, *"The store and release cover would be easier to construct than a simple soil cover, since the compaction required …results in a more complex construction…"* The EPA and NMED disagree with this statement. The technology to compact on relativity flat ground is well understood and relatively easy to perform. Please justify the statement or delete it.

66. Section 5.3.3.2 – Tailing, page 5-31:

a. Please delete the second and third sentences under Tailing Impoundments that begin with *"However, the tailing impoundments are part of CMI operations…"* The EPA has decided to address the timing of response actions at the tailing facility primarily during the decision-making process, not in the FS. It may be determined by EPA that due to the continual leaching of contaminants through the tailing facility during operations, implementation of a remedial alternative may happen prior to closure of the tailing facility for areas that are no longer used for tailing deposition. Additionally, the use of a portion of the tailing facility for siting a renewable energy pilot study is under consideration by CMI and other Chevron technology companies and may affect aspects of the alternatives development and evaluation process in the FS and possibly pilot testing under CERCLA (*see also* General Comment No. 4, above).

b. The tailing facility is not slope limited and is a suitable place for either a multi-layer store and release cover system or a monolithic cover system. As noted above for the Mine Site Area, regardless of the final cover system selected, a compacted layer of tailing or a compacted soil layer beneath the loosely placed growth medium may be required during remedial design for surface prepping prior to cover placement and would allow for a significantly larger amount of protection from high-intensity storm events and animal intrusion.

67. Section 5.3.3.3 – Ground Water, Upper Alluvial Aquifers 1 and 2, page 5-31:

In the last sentence on page 5-31, CMI states: *"Although slurry walls were retained after the initial screening, they were not selected because they are only equally as effective as the extraction wells..."* A demonstration has not been made to justify the exclusion of slurry walls with the physical barriers being carried forward to the detailed analysis. Either make such demonstration or include slurry walls with physical barriers. *See also* Specific Comments on Sections 5.3.2.2 and 5.3.2.3 above.

68. Section 5.3.3.3 – Ground Water, Upper Alluvial Aquifer -1 and 2 page 5-32:

In this section, CMI identifies and screens technologies that would prevent the contact of ground water with historic tailing material near the Change House (MW-17 Area). For detailed analysis, CMI selects options for the collection of water in the

eastern diversion channel to eliminate contact with the historic tailing and extraction wells to remove contaminated ground water in the alluvial aquifer near MW-17. However, these options do not include cover of the historic tailing to prevent or reduce infiltration to ground water. The EPA believes that this issue was raised by NMED during a previous RI/FS meeting when the option for complete removal of the tailing material near the Change House was considered impracticable given the total depth of the tailing material. CMI shall include containment of the historic tailing material near the Change House as a viable technology to be carried forward to the detailed analysis. It is noted that if the containment, collection and extraction technologies developed by CMI are found to be insufficient in cleaning up ground water in the area of the historic tailing material, other CERCLA response actions would be necessary to achieve protectiveness.

69. Section 5.3.3.3 – Ground Water, Basal Bedrock Aquifer-1 and 4, page 5-33:

In the third paragraph, last sentence CMI states, "*Interceptor trenches/cutoff walls/grout curtains and slurry walls were not selected for development of alternatives because depth to ground water is approximately 200 feet below ground surface and these technologies are difficult to construct at such depths in bedrock."* Please provide supporting documentation for statement about depth limitations of such technologies.

70. Section 6.1.1 – Mine Site Water Collection Systems, page 6-1:

The first sentence of the second paragraph states: *"The existing withdrawal well system addresses RAOs by reducing the migration of mine rock leachate, metals, and acidity to ground water and the Red River."* This statement is incorrect. The existing withdrawal wells only partially address RAOs for the Mine Site Area in that they reduce the further migration of contaminants within the alluvial aquifer, as well as the mixing zone between colluvial and alluvial waters. The greatest volume of water removed by the withdrawal wells is most likely from the Red River alluvial aquifer (*see also* General Comment No. 14, above). In reviewing the RAOs, the withdrawal wells do not perform the following:

- "Eliminate or reduce, to the maximum extent practicable, leaching and migration of inorganic COCs and acidity from mine waste rock (acid rock drainage) to ground water at concentrations and quantities that have the potential to cause exceedances of the numerical ground water ARARs; or preliminary Site-specific risk-based cleanup levels" or

- "Restore contaminated ground water to meet state/federal ARARs or preliminary site specific risk-based cleanup levels for inorganic COCs".

Please revise the paragraph accordingly.

71. Section 6.1.1.1 – Ground Water Withdrawal Well System, page 6-2:

a. The first paragraph states that the GWW-series wells *"...were installed along the base of the roadside rock piles to collect water either infiltrating through the mine rock piles or naturally flowing through the hydrothermally-altered colluvium in drainages underlying the rock piles."* This sentence has several inconsistencies. First, it is our understanding that the GWW wells were installed as best management practices (BMPs) associated with the NPDES program to mitigate seepage impacts to the Red River along the mine site, rather than efforts related to any potential EPA CERCLA response action for remediation of ground water. These wells were installed without EPA (CERCLA) input on location or objectives. In addition, these wells were not installed at key locations along the base of the rock piles to maximize the collection of acid rock drainage (ARD) but, instead, they were installed down gradient of the rock piles to capture both rock pile ARD and seep and spring discharge after mine site-impacted colluvial water had commingled with the Red River alluvial aquifer. Please clarify by including a discussion of the purpose and objectives of the GWW-series wells, as well as the regulatory authority under which they were constructed and operated. It is noted that EPA believes these wells are beneficial to reducing contaminant loads within the Red River. However, they are viewed as BMPs, not CERLA-related actions and they do not adequately address capture of mine-related impacted water from leaving the mine site and entering the Red River alluvial system. *See also* General Comment No. 14, above.

b. As stated in the General Comment No. 14, above, CMI shall include discussions on the effectiveness of the ground-water withdrawal wells in attaining ground-water standards or background water quality within the alluvial aquifer. Such discussion shall include a comparison of data from monitoring wells downgradient and upgradient of the withdrawal wells and the roadside waste rock pile drainages.

72. Section 6.1.2 – Storm Water Controls, page 6-3:

While it is correct that the storm water from the upper portions of Sugar Shack South, Middle and Sulphur Gulch South Waste Rock Piles discharge drains to the open pit, storm water from the lower portions of those piles do not. Please describe how storm water is controlled from those lower areas.

73. Section 6.1.2.1 – Capulin Canyon Collection System, page 6-4:

The first paragraph describes collection of ARD at the toe of Capulin Canyon and discharge to the underground mine bedrock aquifer via the subsidence zone. Although currently allowed by Discharge Permit 1055, EPA views this practice as an interim measure that warrants re-evaluation in the FS process and NMED has indicated they may not continue to allow this practice as part of renewal of DP-1055. No modification to the FS Report is needed at this time. Preliminary ARARs

identified for the Site include regulations that prevent and control discharges of impacted water (acidic, toxic or otherwise) into ground-water systems and underground workings and also to prevent adverse impacts on such ground water systems. Preliminary ARARs include 19.8.20.2018 NMAC and 19.8.20.2023 NMAC.

74. Section 6.1.3 – Seepage Interception System at the Tailing Facility, page 6-7:

The description of the seepage collection systems in the vicinity of Dams 1 and 4 do not discuss bypass of the systems by tailing seepage (*i.e.,* the systems are not 100% efficient) that is documented as occurring. In addition, the description of the pumpback system lacks discussion of its intended design, that is, segregation and return of the most contaminated leachate from the tailings dams to an area of the tailing facility where the most significant infiltration to bedrock ground water occurs (Dam 5A area). These details are important to understanding the adequacy of the FS alternative. Please expand on the description to include such noted details.

75. Section 6.2.1.4 – Water Treatment, page 6-11:

This paragraph is misleading. It is true that most water at the mine site is collected from multiple areas and used in the "mining process." However, it is our understanding that impacted water from several collection systems (*e.g.,* Springs 13 and 39) and the underground mine are mixed with mill waste (tailing), pH adjusted, and discharged to the tailing facility via pipeline. Under this scenario, the impacted water is not part of the water used in the mining/milling processes, rather it is used as makeup water to facilitate transport of tailing during active milling operations, as well as being used to maintain hydrostatic pressure in the tailing pipelines and dust control during non-milling periods. Please clarify.

76. Section 6.2.2.2 – Cover, page 6-12:

a. In the second paragraph it talks about a "modified" store and release cover being selected as the representative cover type for the mine site but does not define what makes a "modified" store and release cover different from the simple and multilayer store and release covers described in Section 5. The screening of cover material does modify the characteristics of the proposed borrow source cover material, but it does not change the purpose of a store and release cover. If CMI wants to propose a cover system that is "modified" from the types described in Section 5, CMI shall fully describe what it interprets as a modified store and release cover.

b. In the second paragraph, it is not clear from the statement on vegetation which plants will be part of the initial re-vegetation effort. Does CMI plan to start with native grasses, shrubs, forbs and tree plantings? Please clarify.

77. Section 6.2.2.2.1 – Cover Design Objectives, Stability, page 6-13:

The third paragraph discusses slope angles and factor of safety (FOS). This paragraph describes criteria counter to previous technical discussions on slope angles, factor of safety, and seismic acceleration. The EPA and NMED have stated on several occasions that, where possible, interbench slope angles of 3H:1V must be achieved to the maximum extent practicable (*see also* General Comment No. 6, above), factors of safety (FOS) must meet a minimum of 1.5 for waste rock piles that pose an imminent threat to public health and/or environment (critical structures) and a minimum FOS of 1.3 for other rock piles. A determination by NMED of what the minimum FOS is for a given waste rock pile will be based on the consequence of instability of that rock pile. In addition, to be consistent with previous technical discussions regarding slope stability, a stability analysis must include both static and pseudo-static loading.

The likelihood of a cover sliding on a graded waste rock surface is considered remote unless there is a geotextile or geomembrane in-place. A dump surface FOS of 1.1 to 1.2 suggested by British Columbia Mine Waste Rock Pile Research Committee will not meet the minimum requirements for waste rock pile FOS that must attain a minimum FOS of 1.3 to 1.5 for long-term overall (deep seated) stability. Please modify.

CMI shall provide a discussion of the interface friction angle of 41 degrees stated in the third paragraph and substantiate its use. It appears that it may be a value from literature research and not actual Site-specific shear testing. Norwest used a friction angle of 36 degrees in their evaluation of the Roadside Waste Rock Piles in December 2005. In the same report for a sensitivity analysis, Norwest used 34 degrees as a conservation number based on uncertainty in the rock pile and potential weathering effects of the waste rock material. These were all Site-specific shear testing results. Please explain the differences.

78. Section 6.2.2.2.2 – Borrow, page 6-14:

The last sentence of the first paragraph is technically incorrect and should be re-written. The borrow material itself cannot have "non-erosive slope surface". A cover can be comprised of borrow materials and after a cover is placed it can have a non-erosive surface. CMI shall replace the last sentence of the first paragraph with the following statement:

"*Borrow materials must be non-acid generating and have appropriate gradation. Final cover slopes must have a non-erosive surface, minimize infiltration and support vegetation.*"

79. Section 6.2.2.2.2 – Borrow, page 6-14 and 6-15:

On page 6-14, CMI states that tailing facility borrow material will be from the southwest portion of the facility, and on page 6-15 CMI states the southeast portion of the facility. Please clarify which of these two statements correct.

80. Section 6.2.2.2.2 – Borrow, page 6-15:

a. In the third paragraph, CMI states: *"This well-graded, angular material is suitable ….in minimizing infiltration to materials below the cover."* Provide supporting documentation for such statement or delete it.

b. Please replace the sentence in the third paragraph which states: "*In addition, the suitability of the Spring Gulch material to support vegetation has been demonstrated in test plots (Buchanan 2007)"* with the following sentence:

> "*For Spring Gulch material to be successful, amendments as discussed in Section 6.2.2.2.4 are needed to promote and support vegetative growth.*"

Although EPA does not have review and approval authority of those test plot studies *(see also* General Comment No. 18, above), EPA, in a joint letter with NMED and MMD, dated January 28, 2008, expressed concerns with those studies and the preliminary results for un-amended cover material. Additionally, it is our understanding that MMD will be notifying CMI of the deficiencies of the revegetation test plot studies under separate cover. As per General Comment 18, the test plot studies cannot be used to support development of FS alternatives.

81. Section 6.2.2.2.3 – Vegetation, page 6-16:

a. For the second paragraph, see EPA's General Comment No. 18, above, on the use of vegetation test plot studies for developing FS alternatives and revise the paragraph accordingly. Additionally, revise the paragraph to state that any revegetation studies to be performed for developing an appropriate mix of species in the remedial design must be designed and implemented with the approval of EPA.

b. In the third paragraph, CMI only generalizes about the proposed approach and species for revegetation of covers/caps. Based on such generalizations, EPA cannot ascertain whether CMI has adequately addressed the revegetation comments provided in previous comment letters on the draft Alternative Evaluation Report and the EPA/NMED/MMD comments on the Goathill North reclamation project as they relate to the FS. The EPA cannot determine whether CMI still proposes a revegetation program consisting primarily of trees, similar to CMI's proposal to MMD and NMED for reclamation, and as evaluated in the revegetation test plots. In the backup information provided to EPA on FS cost

assumptions, costs for planting a significant number of saplings per acre are presented in addition to reseeding. So it appears that some combination of grasses, forbes, shrubs and trees is proposed for revegetation, but details are lacking. As stated above, MMD will be commenting on the deficiencies of the revegetation test plot studies under separate cover. Although only a conceptual design is needed for the FS, more detail needs to be provided of an approach which adequately addresses EPA concerns regarding revegetation. As CMI is aware, EPA has disapproved any conceptual vegetation approach which utilizes trees rooting into acid generating waste rock as a component of any store and release cover alternative.

c. In the first sentence of the fourth paragraph, CMI states: *"Vegetation established on rock pile slopes involves an approach of establishing site-adapted plant species directly into amended mine rock."* However, CMI has yet to demonstrate to the satisfaction of EPA that any healthy vegetation can be established in amended waste rock, be it Spring Gulch material or other waste rock (*see also* General Comment No. 18, above). In addition, there are issues with molybdenum toxicity, ARD, lime application and amendment usage. CMI shall either delete the sentence, or rewrite it being specific about the amended waste rock being of a non-acid generating cover material with appropriate gradation.

82. Section 6.2.2.2.4 – Amendments, page 6-16:

Last bullet; please fix the typographical error of steel slap to "*steel slag"*. In addition, EPA and NMED are unaware of any precedence of water treatment sludge being used as a mineral amendment, with the exception of biosolids as an organic amendment which is already listed in the first bullet. Please be very specific to the type of water treatment residuals being referring too and reference trials or case studies that provided details of the type of water treatment residuals being used as mineral amendments.

83. Section 6.3.3.2.2 – Alternative 2, page 6-30 first full paragraph:

To address potential seepage water exposure to visitor/trespassers, CMI proposes to use fencing around the Capulin Pumpback Pond. The problem with this control is it does not address all the other areas of potential exposure to seepage water that is flowing in open channels both in Capulin Canyon and in Goathill Gulch. CMI needs to adequately address the full extent to exposure to seepage in both of these drainages beyond just fencing around the Capulin Pumpback Pond.

84. Section 6.3.3.2.3 – Development and Initial Screening of Alternatives, page 6-32:

CMI states that *"Cover volumes are based on the 3-foot cover thickness, pending the results of the test plot studies".* First, EPA has not reviewed the design or implementation of the test plot studies and, therefore, will not accept the use of those studies in the design of any alternative without such review and approval (*see also*

General Comment No. 18, above). Second, the 3-foot cover thickness is a condition of New Mexico's approved ground-water discharge permit DP-1055 and the NMED and MMD Closeout/Closure Plans for reclamation. The EPA has identified the Closeout/Closure Plans as preliminary TBCs. Therefore, for the FS, the cover thickness is not contingent on CMI's current test plot studies. Further, EPA has previously directed CMI to develop alternatives using 3 feet of cover material to be consistent with New Mexico permitting conditions and reclamation plans. CMI is directed to delete the later part of the sentence.

85. Section 6.3.3.2.3 – Development and Initial Screening of Alternatives, page 6-34:

a. CMI states that *"Removal of roadside rock piles will return the area to its existing grade... and expose hydrothermal scars beneath the rock piles creating a potential for generating acid drainage, run-off, or leachate that could impact ground water or surface water."* The removal of existing waste rock or the exposure of scars will not create a new potential for acid rock drainage. In the RI Report and this FS Report, CMI has already concluded that the existing waste rock and the underlying scars are impacting ground water. The waste rock disposal further disturbed the land and the impact to ground water is greater than if the waste rock was not deposited on the scar. Further, the disposal of waste rock changed the extent and nature of the ground water contamination (as will the removal) beneath the waste rock piles. Please revise the sentence by deleting the segment on exposing hydrothermal scars or modifying it to only pertain to run-off and potential surface water impacts from the run-off.

b. The disturbed surface expression of any underlying footprint of native ground or pre-existing scar material exposed by removal of waste rock will need to be reclaimed in accordance with ARARs. Please revise the text to state such requirements.

86. Section 6.3.3.2.3 – Development and Initial Screening of Alternatives, page 6-34:

CMI states that the construction of an on-Site repository for waste rock that disturbs native ground will have a negative impact to the environment. This specific example is on page 6-34. Other instances can be found throughout the FS. Waste rock piles in New Mexico require permitting pursuant to the WQQC Regulations. New waste rock piles will only be permitted if a demonstration is made that they meet design criteria and that the placement will not result in the degradation of ground water in excess of the WQCC standards. From a remedial alternative perspective, the construction of a new waste repository should not result in negative impacts to the environment and should not change the effectiveness of an option if properly built and monitored. Please revise accordingly.

87. Section 6.3.3.3.4 – Tailings Facility, Alternative 4, page 6-50, last paragraph:

CMI states "*The volcanic aquifer south of Dam No. 4 is not being used for human consumption and is not likely to be used in the future due to the remoteness of the area, steep topography, and relatively great depths to groundwater (approximately 200 feet). Further, molybdenum concentrations are only slightly above the PRG of 0.05 mg/L."* The two statements, above, regarding the current and potential future use of the volcanic aquifer below Dam 4 are incorrect and must be removed. The reasons are as follows:

- Water from the volcanic aquifer down-gradient of Dam No. 4 and the tailing facility is currently being used for human consumption and other domestic uses. The BLM has an active potable water well located approximately 2.25 miles down-gradient of the tailing facility in the volcanic aquifer. In addition, the New Mexico Department of Game and Fish (NMDGF) currently uses water from the volcanic aquifer south of Dam 4 (1.25 miles down-gradient).

- Wells throughout New Mexico are already located in areas equally or more remote, rugged and steep than much of the area overlying the volcanic aquifer down gradient of Dam No. 4; and many potable wells in New Mexico are deeper than 200 feet.

- Molybdenum concentrations are greater than the PRG of 0.05 mg/L. Springs 18 near the NMDGF hatchery have molybdenum concentrations greater than the PRG. Spring 12, halfway between the hatchery and the tailing facility (approx. ½ mile down gradient) have concentrations more than four times the PRG. Molybdenum concentrations in both MW-11 and MW-13 have been increasing in concentration over the last few years and have approached 1.0 mg/L. At these concentrations they are two to three times higher than what they were during the RI data collection period and 15 times higher than the PRG.

CMI shall delete these statements and include a statement that the water in the volcanic aquifer down-gradient of the tailing facility is, and will likely continue to be, a source of domestic use.

88. Figure 6.5 and 6.6 – Mine Site Area Map Current Configuration:

This figure shows a pipeline running down from the concrete bunker at the toe of Goathill North waste rock pile to the subsidence zone. As directed, CMI was to remove the depicted pipeline from the figure or preferentially install an actual pipeline in its place in the field. Since the actual pipeline was not installed, CMI shall remove this depicted pipeline from the map.

89. Section 7 – Eagle Rock Lake Area, page 7-3

Please verify the number of the fourth alternative for the Eagle Rock Lake Area and revise as appropriate.

90. Section 7.1.2 – Balancing Criteria, Cost Section, page 7-7:

    a. Item (a) in this section describes "capital (construction) costs" and uses the terms "direct" and "indirect" costs. Use of these two terms is discouraged by EPA (in Section 2.4 of EPA 540-R-00-002; page 2-5). Instead, CMI should use EPA's recommended terminology of *"including contingency and professional/technical services"*, which provides cost specifics. Please modify.

    b. Item (b) in this section portrays periodic costs as a subset of O&M costs. According to Section 3.1 of EPA 540-R-00-002, periodic costs can be either O&M or capital costs. Consider rephrasing description of periodic costs.

91. Section 7.1.4 – General Parameter – Development of Alternative Costs, page 7-8:

    a. The second paragraph includes an example of cost-effectiveness considerations. However, the example is presented from the perspective of an excessively costly alternative that has additional negative impacts on effectiveness and implementability that would limit the ability for that alternative to be chosen (in this case removal of rock piles). The paragraph introduces unfair bias. Please delete the biased example.

    b. Final paragraph, number 2, the terms "direct" and "indirect" are again used then explained in the paragraph below the reference. These terms as they relate to FS costs are discouraged by EPA. In addition, periodic costs can be capital costs or O&M costs. Please see comments for Section 7.1.2 Costs (a) and (b), and revise accordingly.

92. Section 7.1.4 – Capital Costs, page 7-9:

    The second bullet of the second paragraph describes the time frame of cover construction within Alternatives 2, 3, and 4 for the tailing facility. The detailed cost backups show a construction duration of 6 years (Years 0 through 5) rather than 30 years as the text suggests. Please correct this discrepancy within the document.

93. Section 7.1.4.1 – Present Worth Analysis, page 7-11:

    In the second paragraph, the first two sentences contradict each other with respect to whether present value analyses were performed on capital (construction) costs. Please clarify.

94. Section 7.2.1.1.2 – Analysis of Alternative 1, pages 7-15 and 7-16:

a. In evaluation criterion (1) (Page 7-15), protection of human health is not entirely ensured through implementation of this alternative. Specifically, there are no measures currently in place to keep PCB-contaminated soils from being tracked on the undercarriage of vehicles (such as wash racks) or personnel which could spread PCB and molybdenum contaminants to other locations of the Mill Area or outside of the Mill Area. In addition, while protection of the environment related to ecological risks may not be evaluated, the risks to the environment through spreading of contamination to other locations should be noted for this alternative. Please revise this discussion to include these concerns for contaminant spreading.

b. In evaluation criterion (3), include discussion on the spreading of contamination raised in the previous comment.

c. Evaluation criterion (4) (Page 7-16) is supposed to describe the reduction of toxicity, mobility, and volume of contamination through treatment. The phrase "through treatment" is a requirement of the evaluation. The toxicity, mobility and volume of the contaminants independent of treatment are not pertinent to the evaluation criterion. Please delete the information after the first sentence. This is a global comment pertinent to other alternatives both of the Mill Area and other Site location evaluations where treatment is not used.

d. Evaluation criterion (5), the evaluation of short-term effectiveness does not include adverse impacts to the environment; specifically that PCB contamination could continue to be dispersed due to lack of controls to address tracking or migration of contamination in an active work area. Please revise this discussion.

95. Section 7.2.1.2.1 – Alternative 2 Description, pages 7-17 and 7-18:

a. CMI proposes a 4-inch gravel cap over areas of soil containing concentrations of PCB's greater than 50 parts per million (ppm). It is unclear as to the purpose of the gravel cap. First, the greater than 50-ppm level for PCBs which CMI proposed to cap has no relevance with regards to protectiveness or regulatory capping requirements. For a commercial/industrial (low occupancy) land use, the Toxic Substances Control Act (TSCA) PCB cleanup level is 25 ppm. The 50 ppm level is only relevant to TSCA disposal requirements. Second, TSCA capping requirements under 40 C.F.R. 761.61 (a)(7) require a minimum thickness of 10 inches for a soil cap and 6 inches for an asphalt cap covering PCBs at concentrations greater than 25 ppm. If the purpose, as stated on page 7-18, is to protect mine workers from direct exposure to soils containing PCBs, the cap must meet TSCA capping requirements for thickness and cover PCBs at concentration of greater than or equal to 25 ppm. If the gravel cap is intended to be a limited effort at preventing the further spreading of contaminated soil through wind dispersion, traffic or earth moving operations for surface grading to other areas within and/or outside of the Mill Area, such intent should be clearly stated.

Spreading of PCB contamination to areas outside of the Mill Area where there may be exposure to human or ecological receptors is also a concern. Further, screening level criteria or cleanup levels for PCBs to protect ecological receptors are typically about 1 mg/kg. For other PCB sites, our food web modeling often results in PRGs for total PCBs in soil in the range of about 0.5 to 5 ppm, more or less, depending on receptor and endpoint.

b. In the introductory paragraphs, including the bulleted items, CMI shall note that grading is not the only way that contaminated soils could be spread; wind dispersion and traffic (pedestrian or vehicle traffic) through impacted areas could also cause spreading of soil contamination. In addition, the discussion of best management practices (BMPs) shall be edited to state that the specific BMPs mentioned (such as the signage, gravel layer, etc.) are examples and are not an all-inclusive list and that BMP details may be modified to provide protectiveness (*see also* previous comment (95.a), above, for an alternative BMP for providing protectiveness). The EPA requires that the discussion for this alternative include a BMP Plan (approved by EPA under the CERCLA process) that would contain specific BMP measures based on types of operations at the Mill Area. The text shall also state that the BMP Plan would also specifically address measures to be taken if construction that involves soil movement (such as mill expansion or construction of a water treatment plant) would be undertaken.

c. The final paragraph of this section (page 7-18) references the covering of soils during mill decommissioning. Please modify the description to include use of a marker layer (*i.e.,* visual horizontal indicator as discussed in Alternative 3) under the cover to warn future users of the Mill Area of the presence of contaminated soils underneath. Horizontal markers are only necessary when contaminants are left in place and are not necessary if the cleanup removes contaminants throughout the entire profile. Please modify.

d. In the second to final paragraph of this section (page 7-18), CMI mentions an IC plan. The IC plan should be appended to the FS Report if final. It is also noted that CMI identifies the Village as the "Grantee" for the Deed of Conservation Easement. Since the draft Conservation Easement has not been finalized, the Village should not be identified as the "Grantee" in the FS Report. Rather, a footnote should be inserted stating that CMI has proposed granting the Conservation Easement to the Village as "Grantee" and to other potential third party beneficiaries (EPA, NMED and EMNRD). This comment applies to other sections of the FS Report where the Village is identified as the Grantee.

96. Section 7.2.1.2.2 – Analysis of Alternative 2, pages 7-18 and 7-19:

a. The last sentence of evaluation criterion (1) should also mention that implementation of BMPs during mill operation and covering of contaminated soils after decommissioning would provide some protection of the environment through reduced ability for contaminated soils to be spread to other areas.

Ecological concerns were not addressed for the Mill Area, but habitat may be enhanced during remedial/closure efforts and, therefore, considered in the FS.

b. As noted above for evaluation criterion (4), the information after the first sentence should be deleted. The toxicity, mobility and volume of the contaminants independent of treatment are not pertinent to the evaluation criterion. This is a global comment pertinent to other alternatives both of the Mill Area and other Site location evaluations.

c. For evaluation criterion (5), the discussion of short-term effectiveness should include some reduction in impacts to the environment; specifically that PCB contamination dispersal would be reduced due to implementation of BMPs during mill operations and cover after mill decommissioning to address tracking or migration of contamination in an active work area. In addition, the evaluation of short-term effectiveness impacts from use of diesel fuel and production of CO_2 related to the covering operations after mill decommissioning were excluded. Since these were factors used for evaluation of removal alternatives, please complete them for this alternative to allow comparison to those alternatives.

d. For evaluation criterion (6) and (7), the approval, implementation, and cost of a BMP plan suggested in previous comments for Alternative 2 should be mentioned here. Please modify.

97. Section 7.2.1.3 – Alternative 3, General Description, page 7-20:

a. This alternative does not need the Best Management Practices (BMPs) for in-place management of PCBs. It suggests that such alternative is a post mining alternative and would be implemented only after decommissioning of the mill area or some other significant period of time after issuance of the ROD, with some measure of PCB management required in the interim. The EPA has previously indicated to CMI at RI/FS meetings that it may decide to clean up the PCB contamination now, rather than wait until mine closure, due to the toxicity of PCBs and risk for spreading contamination further over the remaining life of the mine. Therefore, such practices would not be required. If EPA decides to wait until mine closure to remediate PCBs, it could combine Alternative 2 with Alternative 3, thereby utilizing BMPs during the operational period. Please delete the BMPs from Alternative 3 and revise the analysis sections as appropriate.

b. This paragraph provides a general description of the alternative and associated limiting considerations. The TSCA definition for low occupancy areas should briefly be provided either here or in Section 6, the preliminary alternative screening. Also, while conversion to a forested area could be considered "low occupancy use" under TSCA, it is unclear why "commercial/industrial" cleanup standards are proposed. It should be made clear these cleanup standards were chosen due to the ongoing industrial use of the Mill Area.

98. Section 7.2.1.3.1 – Alternative 3, Description, pages 7-21 and 7-22:

a. The description of this alternative suggests that PCB contamination above 25 ppm would only be removed to a depth of 2 feet and a visual horizontal indicator be placed for soils below 2 feet that have PCB concentrations above 25 ppm. The text states that this removal depth assumption is based on the lack of RI data for PCBs below this depth. While an assumption of 2 feet may be suitable for cost purposes in the FS, it is not appropriate for CMI to assume that removal only has to occur to this depth because there was a failure during the RI to define vertical extent of PCB contamination in the Mill Area. CMI shall revise the alternative description to state that PCB contamination above 25 ppm would be removed regardless of depth (*see also* General Comment No. 15, above). Since PCB contamination would remove all PCB contamination above 25 ppm, a visual horizontal indicator would not be needed and this would slightly change the language within the deed notice description (*i.e.,* contamination above industrial use levels would no longer exist at the Site). Please make this change, which effects the evaluations related to balancing criteria. This comment is also pertinent to the first full paragraph on page 6-23.

b. The PCB cleanup level based on the low occupancy scenario is specified in TSCA as 25 ppm. In the detailed analysis section for Alternative 3, Section 7.2.1.3.2, the analysis of overall protection of human health and the environment and the reduction of toxicity, mobility and volume through treatment talks only about mitigating exposure to PCBs at concentrations greater than 50 ppm. Please use 25 ppm as the target cleanup level for PCBs (as specified in TSCA) and follow TSCA regulations on what constitutes a protective cap for limiting exposure in a low occupancy scenario. *See also* Specific Comment No. 99, below.

c. It is assumed that this alternative includes treatment (*i.e.,* incineration) of all removed PCB-contaminated soil as a component of the remedy when the TSCA regulations do allow simple disposal within a permitted chemical waste landfill. Certainly CERCLA has a preference for treatment and an evaluation criterion that evaluates that preference, but it seems inclusion of treatment for all excavated soil in this and other removal alternatives may increase the costs of these alternatives substantially relative to on-site containment remedies.

   The Clean Harbors Kimball facility chosen for evaluation is primarily a thermal oxidation incinerator; the Subtitle C disposal facility associated with it is for the incinerator ash. A closer, more cost-effective disposal solution may include (as an example) the Clean Harbors Deer Trail Facility in Colorado. Not only is it a shorter distance than Kimball, NE (approximately 240 less miles roundtrip, which could lower transportation costs), but the Colorado facility is a Subtitle C disposal facility that can accept TSCA wastes without

incineration (which may lower disposal costs, especially without treatment). While we have not obtained disposal costs at the Deer Trail facility, it may be beneficial for removal alternatives to assume that a large percentage of the excavated soils are disposed of without incineration at a facility like the Deer Trail facility and a small percentage be disposed of after incineration at a facility like Kimball. This preserves the aspect of off-Site treatment and disposal for soils with the highest concentrations of PCBs (and thus the majority of contaminant mass reduction through treatment) while making the alternative more cost-effective overall. This comment applies to all alternatives at the Mill Area involving treatment and off-Site disposal. If this change is made, the evaluations related to all balancing criteria (not just cost) should be adjusted accordingly.

99. Section 7.2.1.3.2 – Analysis of Alternative 3, pages 7-23 and 7-24:

a. For evaluation criteria (4), page 7-23, delete the information for toxicity, mobility and volume of the contaminants independent of treatment that are not pertinent to the evaluation criterion, as noted for Alternative 2.

b. Evaluation criterion (5) includes quantities of diesel and CO_2. However, the calculations used to determine the amount of diesel fuel used and CO_2 production were not included in the appendices, or at least they were not readily apparent. Please include these calculations for all alternatives and locations that include this information or direct us to their location.

c. The discussion in evaluation criterion (6) references the use of Spring Gulch rock pile material as cover. Since the Spring Gulch rock pile does contain sulfide mineralization and molybdenum, it should be stated that the Spring Gulch rock pile would be segregated to minimize inclusion of these contaminants in the backfill materials. Please clarify.

100. Section 7.2.1.4 – Subalternative 4A General Description, page 7-25:

a. The TSCA definition for "high occupancy areas" should briefly be provided either in this paragraph or in Section 6 (Development and Initial Screening of Alternatives). Also, since a "high occupancy use" under TSCA (*e.g.,* residential area) was evaluated, it is unclear why a self-sustaining forested ecosystem was chosen for the Mill Area under this alternative. Subsequent to implementing this alternative, it would be suitable for high occupancy use. It is also assumed under such land use scenario, approval for a modification to the current PMLU would be obtained. Please clarify.

b. The EPA comments related to BMP planning and implementation for Alternatives 2 and 3 prior to mill decommissioning also apply to this alternative as well.

c. These two comments also apply to Subalternative 4B (Section 7.2.1.5.1).

101. Section 7.2.1.4.1 – Subalternative 4A Description, pages 7-27 and 7-28:

a. The description of this alternative suggests that PCB contamination above 10 ppm would only be removed to a depth of 2 feet and a visual horizontal indicator be placed for soils below 2 feet that have PCB concentrations above 10 ppm. The text states that this removal depth assumption is based on the lack of RI data for PCBs below this depth. As noted above, while an assumption of 2 feet may be suitable for cost purposes in the FS, it is not appropriate for CMI to assume that the removal depth should be limited to 2 feet (the maximum depth of characterization) in the Mill Area (*see also* General Comment No. 15, above). The alternative description should be revised to state that PCB contamination above 10 ppm would be removed regardless of depth. Since PCB contamination would remove all PCB contamination above 10 ppm, a visual horizontal indicator would not be needed for removal areas (only capped areas). Implementing this change requires modification of the balancing criteria evaluations in the FS. Please modify.

b. The comments for Alternative 3 related to choice of disposal facilities, described above, also apply to this alternative.

c. These two comments also apply to Subalternative 4B (Section 7.2.1.5.1).

102. Section 7.2.1.4.2 – Analysis of Subalternative 4A, pages 7-28 and 7-29:

a. For evaluation criterion (4), delete the information for toxicity, mobility and volume of the contaminants independent of treatment that are not pertinent to the evaluation criterion.

b. For evaluation criterion (5), the short-term impacts to the community related to offsite transport and disposal of PCB-contaminated soils above 10 ppm were not included. Please revise.

c. For evaluation criteria (6), the Spring Gulch waste rock pile contains sulfide mineralization and molybdenum; therefore, please state that the Spring Gulch waste rock pile would be segregated to minimize inclusion of these contaminants in the backfill and cap materials.

d. These comments also apply to Subalternative 4B (Section 7.2.1.5.2).

103. Section 7.2.1.4 and 7.2.1.5 – Subalternative 4A and 4B, pages 7-30 and 7-34:

For subalternatives 4A and 4B, please confirm that the costing tables have not been reversed. If necessary please revise the relevant sections.

104. Section 7.2.1.5.1 – Subalternative 4B Description, page 7-31:

Delete the third bullet describing the visual horizontal indicator. *See also* General Comment No. 15, above.

105. Section 7.2.1.5.2 – Analysis of Subalternative 4B, page 7-32:

Under evaluation criteria (3) and (4), the depth of excavation will not be limited to 2 feet to remove PCBs at concentrations above 10 mg/kg and a visual horizontal indicator will therefore not be necessary (*see also* General Comment No. 15, above). Please revise the text to remove these aspects of the alternative analysis.

106. Section 7.2.1.6.1 – Subalternative 5A Description, pages 7-34 through 7-36:

a. The description of this alternative suggests that PCB contamination above 1 ppm would only be removed to a depth of 2 feet and a visual horizontal indicator be placed for soils below 2 feet that have PCB concentrations above 1 ppm. The text states that this removal depth assumption is based on the lack of RI data for PCBs below this depth. As noted above, the alternative description should be revised to state that PCB contamination above 1 ppm would be removed regardless of depth. Since all PCB contamination above 1 ppm would be removed, a visual horizontal indicator would not be needed for removal areas (only capped areas). This modification requires changes to the evaluations related to balancing criteria. Please revise accordingly.

b. Comments for Alternative 3 related to choice of disposal facilities for PCB-contaminated soils apply to this alternative.

c. Is there a reason that molybdenum-contaminated soils could not be disposed of at the tailings facility and covered there as part of reclamation? It is understood that for the PCB-contaminated soils there may be TSCA compliance issues, but the tailings are already impacted by molybdenum so disposal of a relatively small volume of soil contaminated only with molybdenum seems feasible. This would provide significant transportation and disposal cost savings for this alternative. This should be evaluated.

d. In the last full paragraph on page 7-36, it states that upon decommissioning, cover and revegetation with amended Spring Gulch material will be done for the areas not already addressed in the alternative. Please specify that such areas will only be excluded from the cover/revegetation work if they satisfy the reclamation requirements set forth under the NM Mining Act and regulations, as determined by EMNRD.

e. These comments also apply to Subalternative 5B (Sections 7.2.1.7.1) and Subalternative 5C (Section 7.2.1.8.1).

107. Section 7.2.1.6.2 – Analysis of Subalternative 5A, pages 7-37 and 7-38:

a. For evaluation criterion (4), delete the information for toxicity, mobility and volume of the contaminants independent of treatment that are not pertinent to the evaluation criterion.

b. For evaluation criterion (6), the Spring Gulch waste rock pile contains sulfide mineralization and molybdenum. Therefore, please revise to state that the Spring Gulch rock would be segregated to minimize inclusion of these contaminants in the backfill and cap materials.

c. These two comments also apply to Subalternative 5B (Sections 7.2.1.7.2) and Subalternative 5C (Section 7.2.1.8.2).

108. Section 7.2.1.6.2 – Analysis of Subalternative 5A, page 7-38:

For evaluation criterion (6), the approximate time for implementation was provided for this alternative but not previous alternatives (Alternatives 2, 3, 4a, and 4b). Please include durations for implementing all alternatives to allow comparison.

109. Section 7.2.1.7.2 – Analysis of Subalternative 5B, page 7-42:

For evaluation criterion (6), please relocate the discussions concerning amounts of CO_2 emitted and diesel fuel used to the discussion of short-term effectiveness (related to adverse impacts to the environment) rather than implementability. This modification provides consistency within the evaluation sub-criterion and other alternatives previously discussed.

110. Section 7.2.1.8.2 – Analysis of Subalternative 5C, pages 7-45 and 7-46:

a. For evaluation criterion (3), the discussion for this criterion mentions removal and offsite disposal; this alternative is supposed to reflect on-Site treatment with a mobile unit of all contaminated soil and on-Site disposal. Please revise this discussion for on-Site treatment and disposal.

b. For evaluation criterion (4), delete the information for toxicity, mobility and volume of the contaminants independent of treatment that are not pertinent to the evaluation criterion. Also, the discussion provided on treatment for this criterion mentions the facility in Kimball, NE and a cover for the remaining soils; this alternative is supposed to reflect on-Site treatment with a mobile unit of all contaminated soil. Please revise this discussion for on-Site treatment.

c. For evaluation criterion (5), the evaluation of short-term effectiveness impacts from use of diesel fuel and production of CO_2 related to the removal and disposal operations after mill decommissioning were excluded. Since these were factors used for evaluation of other removal alternatives, they should also be completed for this alternative to allow comparison to those alternatives. Further, this discussion must include details on the risks to workers and the environment from on-Site treatment of contaminated soil. Please modify.

d. For evaluation criterion (6), the statement that subcontractors are not readily available for on-Site treatment is not accurate. The EPA has contacted thermal treatment vendors that have indicated they can support projects with adequate notice. A more accurate statement is that there are a limited number of vendors in the U.S. that can provide these services. Please revise this statement.

111. Section 7.2.2 – Mine Site Area, page 7-48:

a. This section describes the various components of the mine site that are addressed in the FS. The Spring Gulch waste rock pile should be specifically included in the second paragraph as part of the description of the Mine Site Area. While not specifically part of the contamination problems addressed as part of the Mine Site Area, low pH and high molybdenum have been documented in areas of this pile that require remedial consideration, in addition to the use of this waste rock pile as a key element of containment alternatives for the Mine Site Area. Please clarify.

b. The Sugar Shack West and Goat Hill North waste rock piles have undergone significant modification (grading and reshaping along drainage improvements) related to ongoing reclamation measures implemented at the mine site. It is important to detail these changes early in this section as well as the impacts of these changes on the various alternatives. Please modify accordingly.

112. Section 7.2.2.1.1 – Alternative 1 Description, page 7-50:

Please revise the 5th sentence in the last paragraph on page 7-50 to read:

"*The objective of the system is to remove an amount of water that is about 2 to 3 times the estimated amount of flow to the alluvial aquifer…*"

113. Section 7.2.2.1.2 – Analysis of Alternative 1, pages 7-51 and 7-52:

a. Under evaluation criterion (1), this alternative cannot be deemed effective because ecological receptors are not protected through implementation of this

alternative. Specifically, there are no measures currently in place for the mine waste to address the first two RAOs listed in Section 4.1.2.3. Additionally, it is unclear how Alternative 1 can be protective of human health, while Alternative 2 (Section 7.2.2.2.2, page 7-54) is only partially protective. It states that Alternative 2 has potential human exposure to affected ground water, while Alternative 1 does not. Viable alternatives must meet the threshold criteria. Please revise this discussion.

b. For evaluation criterion (2), there are additional ARARs not met with this alternative. Specifically, relevant and appropriate requirements that stipulate reclamation and which provide standards for that reclamation (such as New Mexico coal reclamation regulations) are not addressed. Viable alternatives must meet the threshold criteria, including compliance with ARARs. Will these ARARs be met in the long-term or will CMI pursue an ARAR waiver? Please revise this discussion as well as the same discussion in Section 7.2.2.2.2 – Analysis of Alternative 2 (page 7-54).

c. For evaluation criterion (3), this alternative cannot be deemed to have long-term effectiveness because ecological receptors are not protected through implementation of this alternative. Specifically, there are no measures currently in place for the mine waste to address the first two RAOs listed in Section 4.1.2.3. Please revise this discussion as well as the same discussion in Section 7.2.2.2.2 – Analysis of Alternative 2 (page 7-55).

d. For evaluation criteria (3) and (4) CMI shall include a discussion that the collected water treated by lime neutralization is conveyed to the unlined tailing facility, where (based on water balance estimates) a significant portion of it is believed to seep downward through the tailing (tailing seepage) to the underlying ground water, resulting in the flushing of other contaminants within the tailing to ground water. Hence, this action contributes to the increase of contaminants such as molybdenum and sulfate in ground water at the tailing facility. Therefore, Alternative 1 is neither effective nor contributes to the overall reduction of toxicity, mobility or volume of molybdenum, sulfate and other contaminants by the lime neutralization of the ground-water medium from a Site-wide perspective.

114. Section 7.2.2.2.2 – Analysis of Alternative 2, page 7-55:

a. For evaluation criterion (3), the statement that *"the groundwater withdrawal well system along the roadside rock piles is effective at removing metals and other inorganic load that is equal to the metals and other inorganic load from rock piles"* needs to be qualified. The loading analysis presented in the FS appears to be inconsistent with the most recent loading analysis presented in the Draft Final RI Report. The FS load analysis considers two infiltration scenarios, moderate and high, whereas the revised RI includes an additional load estimate based on the yield analysis, plus a sensitivity analysis of the

moderate and high infiltration scenarios. In addition, the revised RI load analysis includes the possibility that discharge into the Red River may be occurring from Goathill South and Sugar Shack West. In the FS analysis, these drainages are omitted from sources of loading to the river. The addition of these drainages nearly doubles the total load of metals potentially reaching the Red River. Therefore, for criterion (3), revise so that the first sentence states: *"Alternative 2 is moderately effective and permanent."* Then add the qualification to the third sentence of the paragraph, stated above, to read: *"...; however, estimated metals loading from the Goathill and Slickline drainages to the Red River alluvium are not addressed."*

While it is the opinion of EPA that the best estimate of flow from the side drainages is from the yield calculations, the effectiveness of the withdrawal system based on load needs to be qualified with a caveat. That is the load removal is equal to the rock pile discharge only under moderate infiltration and the yield analysis infiltration. Under high infiltration, the rock pile loads are approximately two times the load removal rate.

Additionally, the contaminant concentration data (presented on Table 1, General Comment No. 14, above) suggest that the withdrawal system is not adequately reducing the loads to a level that is equal to the upgradient loads entering the reach of the Red River adjacent to the mine site. For example, reference concentrations of cadmium and cobalt are below New Mexico standards entering the upgradient boundary of the mine site as measured in MMW-17. However, cadmium and cobalt were detected in all of the downstream wells in Table 1 at levels above the New Mexico standards and above the UTL/UPL of the reference wells. An increase in other metals such as aluminum, beryllium, manganese, and nickel were also noted above reference concentrations. On this basis, it may be concluded that the withdrawal system is not adequately reducing contaminant concentrations in alluvial ground water downgradient of the roadside rock piles side drainages. As demonstrated in Table 1, there is a statistically significant increase in concentrations in many of the wells located downgradient of those side drainages. Please include these discussions on the apparent ineffectiveness of the withdrawal system in removing contaminants (*see also* General Comment No. 14, above).

b. For evaluation criterion (4), specifics regarding method of treatment (lime addition during milling) and effectiveness of treatment from a Site-wide perspective should be added, as described in the previous alternatives and EPA comments provided herein. Please revise.

c. For evaluation criterion (7), the reference to Section 7.2.2.5 for costs of the water treatment plant is incorrect. It should be Section 7.2.2.7.2 – Analysis of Subalternative 4A. Revise accordingly.

115. Section 7.2.2.3.1 – Analysis of Subalternative 3A, pages 7-58 and 7-59:

a. For targeted overall slopes of 2H:1V, *see also* General Comment No. 6, above and revise accordingly.

b. There appears to be little to no discussion on how the covers constructed with Spring Gulch material will reduce infiltration and subsequent leaching of contaminants to ground water. In fact the conceptual cover layout seems rather vague other than a minimum 36 inches of cover material. While it is acknowledged that Section 6.2.2.1 provides a lot of initial information on the composition and construction of covers, the application of a modified store and release cover as discussed in Section 7 to meet RAOs and ARARs related to cover performance appears to be unsubstantiated. Specifically, it appears that installation of a store and release cover (that can adequately reduce infiltration to ground water) cannot be effectively constructed or maintained on steep slopes (2.5H:1V or steeper) and at those steep slopes, runoff may be a more important consideration for reduction of infiltration than evapo-transpiration. Additionally, store and release covers rely on the use of transpiration from established vegetation. Visual observations of the test plots during Site tours indicate that vegetation cannot be established adequately to perform significant transpiration even over time.

   The discussion within Section 6.2.2.2 also mentions potential use of a low hydraulic conductivity or a high density compacted barrier layer to meet goals and objectives. Is this still a consideration for the Mine Site Area, especially if a store and release cover cannot perform adequately? While it is understood that specifics related to the cover configuration can be determined during RD/RA, it seems that the advantages and disadvantages between a store and release cover versus a store and release cover with a barrier layer could be substantial and thus affect the conclusions of the alternatives evaluation. At a minimum, some compaction of the waste rock surface in preparation for cover will most likely be necessary. Please clarify.

116. Section 7.2.2.3.1 – Spring Gulch Rock Pile, page 7-62:

The Spring Gulch waste rock pile is described as the source of cover material (non-acid generating black andesite and aplite) and that it will be screened for 8-inch minus material before use. Section 6.2.2.1 provides additional information on the composition of the Spring Gulch waste rock pile and justification for its selection and use as cover material. Some of this justification includes a large overall volume when compared to cover requirements and an average paste pH that is near neutral, which indicates that the majority of this material is non-acid generating. The text states that potential acid-generating material will be segregated from the non-acid generating material before use, in part through visual inspection for sulfide mineralization.

It is not clear how CMI plans to identify and segregate Spring Gulch material in relation to acid generating potential. Paste pH does not indicate whether a material will have long-term acid generating potential, and an overall paste pH with near neutral results does not indicate whether there are areas of Spring Gulch material with significantly higher long-term acid generating potential. There are visual indications on the mine site test plots and other on-Site locations of placed Spring Gulch material that it contains significant amounts of pyrite and potentially contains other sulfide minerals as well. Thus it appears that the cover material, as placed on the test plots, does in fact contain potentially acid-generating minerals and that separation of this material cannot be adequately performed, as evidenced in the cover materials for small test plots (which presumably were more carefully prepared than full-scale cover construction would be).

Please provide additional information in the FS on how CMI will characterize the Spring Gulch waste rock pile (both on the surface and at depth) and an improved process for segregation of non-acid generating Spring Gulch materials from the acid-generating materials during full-scale remedial action implementation.

117. Section 7.2.2.3.2 – Analysis of Subalternative 3A, page 7-65:

a. Under Short-Term Effectiveness, CMI states *"The actual risk of death and injury posed by remediation activities can be orders of magnitude higher than the hypothetical risk posed to future site users by leaving the site undisturbed."* Please provide information to support this statement or revise.

b. CMI also states in same paragraph *"During construction of the new water treatment plant, potential risks to workers, community, and the environment are likely to occur."* Please clarify, especially the risk perceived to the community and the environment.

118. Section 7.2.2.4.1 – Pit Repository, page 7-71:

Throughout Section 6, CMI indicates that waste rock piles and the waste rock backfilled into the open pit will be covered with amended and revegetated Spring Gulch material (*see* page 6-31). However, in the third paragraph under Pit Repository, last sentence, CMI states: *"This cover will not be amended as it is not expected to be revegetated."* The EPA disagrees with this statement. CMI must cover and revegetate all acid-generating waste rock for protection of ground water. Also, all waste rock covers must have healthy vegetation so that a store and release cover system will function properly. CMI shall modify this section by deleting the sentence stated above and replacing it with a description of the amended vegetative cover for the waste rock to be held within the pit repository.

This comment also applies to similar text under Pit Repository on pages 7-78 and 7-84.

119. Section 7.2.2.4.2 – Analysis of Subalternative 3B, page 7-72:

In evaluation criterion (1), revise the text to specify that the partial removal of specific rock piles will allow for slopes considered protective by EPA (*i.e,* 3H:1V) to be achieved to the extent practicable. *See also* General Comment No. 6, above.

120. Section 7.2.2.5.1 – Subalternative 3C1 Description, page 7-76 to 7-78:

a. Beginning on page 7-76, in the description of each roadside rock pile, CMI states: *"The complete removal of the mine rock achieves returning the native slopes to pre-mine conditions. Per agency comment under a complete rock pile removal alternative, a cover is not needed."* The EPA disagrees with the statement that complete removal of a waste rock pile will return the underlying slope back to the "pre-mined" condition. It is highly likely that the footprint of native ground beneath the waste rock has been contaminated by metal leaching and ARD and will have to be covered and revegetated. Please delete the two sentences stated above throughout all of Section 7.

b. The second paragraph under Groundwater Management is out of place in the document and needs to be deleted. It represents the analysis of Long-Term Effectiveness and Permanence for Subalternative 3C2.

121. Section 7.2.2.5.2 – Analysis of Subalternative 3C1, page 7-79:

In the first paragraph on page 7-79, CMI states "*Exposed scar creates the potential for generation of acid rock drainage and potential for negative impact to surface water and groundwater."* This statement implies that the scars covered by the waste rock do not create potential for generation of acid rock drainage and adverse impacts to ground water and surface water. This contradicts CMI's interpretation on the sources of impacts to ground water and surface water at the mine site in the draft final RI Report. It also contradicts CMI's interpretation of the effectiveness of the ground water extraction alternatives within this FS Report, as CMI indicates that such options will remove load by natural scar material. The statement is misleading. Please delete it.

122. Section 7.2.3.1.1 – Alternative 1 Description, page 7-111:

a. The third paragraph discusses the water balance at the tailing facility. The second sentence reads: "*The majority of uncollected seepage is infiltrating to the basal bedrock (volcanic) aquifer beneath and south of Dam 4 impoundment and the molybdenum PRG of 0.05 mg/L is exceeded in wells in this area, with concentrations up to 0.95 mg/L".* This sentence needs to be expanded to describe more completely how current operations are impacting

the volcanic aquifer and surface water of the Red River beyond the tailing facility. CMI shall replace this sentence with the following:

"Uncontrolled seepage primarily is documented infiltrating downward from the portion of the tailing facility in the vicinity of Dam 4 (est. 770 gpm) and Dam 5A (est. 1,700 gpm) to the basal bedrock (volcanic) aquifer. Bedrock ground-water flow patterns identified in the draft final RI Report (URS 2008) show this deep ground water moving to the south-southwest toward the Red River. This seepage-impacted bedrock ground water (with elevated molybdenum and sulfate) has been detected/measured in monitoring wells south of Dam 4 (MW-11 and MW-13), as well as in nearly every spring along the Red River between the tailing facility and the state fish hatchery (one mile south of the tailing facility). Concentrations of molybdenum, and in some instances sulfate, have been steadily increasing in some local wells and springs since 2002. It is highly likely that this increase in concentrations correlates to an increase in mining and tailing disposal operations, as well as water management activities in the Dam 5A area, during this same time period"

This is supported by data presented in Appendix 5.5-2 of the draft final RI Report and the DP-933 Quarterly Monitoring Reports for molybdenum and sulfate in Springs 12, 15T, and18 between 2002 and 2008.

b. In addition, the detailed evaluation of the FS criteria, discussed in Section 7.2.3.1.2 (for Alternative 1; pages 7-112 and 7-113) and Section 7.2.3.2.2 (for Alternative 2; pages 7-116 through 7-118) need to be updated to address the adverse short-term effectiveness impacts of No Action (for Alternative 1) and Limited Action (for Alternative 2) on the ongoing impacts that current operations have on the ground-water resources at the tailing facility. Please expand these discussions.

123. Section 7.2.3.2.1 – Alternative 2 Description, page 7-115:

In the first full paragraph on page 7-115, CMI discusses the results of a cover performance analysis for the tailing facility and the 9-inch thickness of cover suitable for closure (RGC 1997). The cover performance analysis was done before the start of the RI/FS and was never approved by EPA. Therefore, it cannot be used by CMI in developing alternatives (*see related* General Comment No. 18). Delete the statements on the performance analysis and suitability of a 9-inch thick cover.

Further, as stated on page 7-114, the purpose of the cover is partly to address ecological risk from molybdenum in tailing. The statements on suitability of cover thickness do not address the mitigation of risk to ecological receptors. They are solely focused on reducing net infiltration. During field reconnaissance during scoping of the RI/FS, observations were made by the field team (including

Susan Roddy, Jon Rauscher, and Mark Purcell of EPA) of holes made by burrowing animals through the interim soil cover at the tailing facility. The holes went deep enough to penetrate more than a foot of soil and into tailing material. CMI shall include a discussion on the need for the cover to mitigate the risk to ecological receptors.

124. Figure 7-1 – Asphalt Cover Details:

Figure 7-1 depicts an asphalt cap of 4 inches, where the text on page 7-31 talks about a TSCA compliant asphalt cap needing to be 6 inches. As stated above, TSCA regulations for cap requirements under 40 CFR 761.61 (a) (7) stipulate that an asphalt cap has to be a minimum of 6 inches and a soil cap a minimum of 10 inches. Please correct the discrepancies.

125. Appendix C: page C-2:

The justification for the area weighting of elevation is inadequate. In response to the Golder 2005 and 2006 reports suggesting that there is not a relationship between elevation and precipitation, CMI states that the mean annual precipitation verses elevation relationship of five inches per 1,000 feet at a regional scale is well documented and that similar ranges in elevation are observed at the mine. However, this relationship has not been observed in the precipitation data submitted to NMED from the Site. The precipitation around the mine site is likely complex and influenced by local orographic effects and data do not exist to support the use of this relationship between precipitation and elevation, especially at a 400-foot resolution. Regardless of whether or not it is considered more conservative by URS, CMI should use Site-specific data where available.

126. Page C-3:

The assumption that the underground workings act as a perfect capture zone is unsubstantiated. All fracture flow and flow within Capulin drainage are likely not intercepted. This section needs to be rewritten, with further details on the uncertainty of the capture zone.

127. Page C-21:

Last Bullet – CMIs conceptual approach of what they consider conservative or not should be removed from this document. It is irrelevant and has nothing to do with the ground water budget, load analyses and operational water usage for the mine site.

128. Page C-23:

CMI has yet to demonstrate that seepage does not bypass the Capulin Pumpback Pond, and that water impacted by historic spills discharges to the Red River

alluvial aquifer. Therefore, CMI must include the Lower Capulin area in all estimates of water volume and contaminant concentrations reaching the Red River at the mouth of Capulin Canyon.

129. Appendix F – Contingency in Cost Summary Tables:

Contingency was presented on the cost summary tables for construction and O&M costs as a single percentage with no documentation as to the source of the contingency number. While it is appropriate to apply contingency as a single percentage, documentation (notes) should be provided next to each contingency describing the amount of the percentage that is scope contingency versus bid contingency. Scope and bid contingency should take into account the suggested percentages as described in Section 5.4 of EPA 540-R-00-002, and notations should be provided for the sources of contingency information used for each type of contingency. Please revise accordingly.

130. Appendix F – Professional/Technical Services in Cost Summary Tables:

It appears that use of percentages for professional/technical services are not consistent with those recommended in Section 5.5 of EPA 540-R-00-002. Professional/technical services should take into account the suggested percentages as described in Section 5.5 of EPA guidance 540-R-00-002, specifically percentages that are based on the total capital, O&M, or periodic cost of an alternative, plus contingency. For instance, construction costs for Alternative 2 of the Mill Area (bottom of page 3 of 17) uses remedial design, construction management, and project management percentages of 6%, 6%, and 5% respectively. However, Exhibit 5-8 (page 5-13) of EPA 540-R-00-002 recommends percentages of 12%, 8%, and 6% for use on construction costs with contingency between $500K and $2M. Please review and revise percentages through out this appendix as needed for conformance with the guidance. In addition, assumptions for professional/technical services should be listed next to the value in the cost summary.

131. Appendix F – Present Value Analyses in Detailed Cost Summary Tables:

a. Present value analyses for O&M or periodic costs with differing periods of application should be discounted individually as described in Section 5.7 of EPA 540-R-00-002, not in aggregate which results in differing present value costs. Please revise.

b. Please list the discount factors used for each present value analysis on the summary and annualize as performed in the detailed cost backup.

132. Appendix F – (Supplemental Information):

Detailed Cost Backup Tab: Backup cost sheets were provided to EPA by CMI (on October 1, 2008) as supplemental information to the Detailed Cost Summaries in Appendix F. EPA has the following comments pertaining to these Detailed Cost Backup sheets:

a. The detailed cost backup presented to EPA electronically should be included in Appendix-F within the next revision of this FS. At a minimum, please include this backup on CD-ROM.

b. Rounding is not performed consistently for subtotals throughout the detailed cost backup. Recommend rounding subtotals at least to the nearest $1,000. Please modify for clarity and consistency.

c. Detailed cost backup worksheets are primarily meant to provide details such as unit quantities, unit costs, and contractor markups (overhead and profit) as well as area adjustment factors and escalation factors for each work line item so that subtotals for components of the alternative scope can be assembled in the cost summaries. Application of contingency, professional/technical services costs, and present value analyses as presented in EPA 540-R-00-002 are meant to be performed on the subtotals of these scope items for the total capital (construction), O&M, and periodic costs within the cost summaries. As presented in the detail backup provided separately from Appendix F, application of contingency, professional/technical services costs, and present value analyses within the detailed cost backup worksheets and also within the cost summaries in Appendix F (using slightly different methodologies) has resulted in slightly different total alternative costs between the detail backup and the summaries which are difficult to follow. Please perform the application of contingency, professional/technical services costs, and present value analyses only in the cost summaries as shown in Exhibits 5-7, 5-9, and 6-2 of EPA 540-R-00-002. Then for the detailed cost backup, only present unit quantities, unit costs, and contractor markups (overhead and profit) as well as area adjustment factors and escalation factors for each work line item with subtotals for the scope item as shown in Exhibits 5-3, 5-4, and 6-1 of EPA 540-R-00-002.

d. Present value analyses for O&M costs are presented on an annual basis in the post-construction years, with which EPA agrees. However, the numbering of post-construction years' O&M does not start sequentially after the final year of construction. For instance, construction costs for Alternative 2 at the tailings facility are assumed to occur from Years 0 to 5, yet the O&M period starts over at Year 1 instead of Year 6. Because the present value discounting was performed internally using formulas in MS Excel® using the year periods presented in the headers of the columns, the present value analysis is not discounted properly (*i.e.,* discounting of the alternative cost is less than if the

years were presented sequentially). Please revise the formulas within the Excel® spreadsheet for present value analysis so that discounting factors used are consistent with the year in which the cost falls relative to construction or post-construction. An example of annual discount factors to be used for a 7% discount rate is given in Exhibit 4-4 of EPA 540-R-00-002.

e. The durations listed in the headers for construction or O&M (number of years) do not always match the annualized cost breakdowns presented on construction and O&M tables. For instance, construction costs for Subalternative 3A at the tailings facility are assumed to occur from Years 0 to 5, yet the column header for total number of years to the right states a total of 2 years. Please check all tables for consistency with regards to total numbers of years relative to what is presented and revise accordingly.

133. Appendix F – (Supplemental Information) Unit Rate Descriptions and References Tab:

Additional backup cost information for Appendix F provided to EPA by CMI (on October 1, 2008). EPA has the following comments pertaining to these backup cost sheets:

a. The cost backup tables cite RSMeans as a source of unit rate cost information. Because various versions of RSMeans references exist, CMI should provide specifics of the source information. At a minimum, for the reference information, please include which RSMeans cost source was used and reference code (based on work breakdown structure) for the line item referenced.

b. Cost sources based on vendor information should clearly state the vendor used, or separate vendor information should be attached separately. Please provide this information.

c. Some of the cost backup references CMI's financial assurance cost estimates. It is assumed that costs for the financial assurance were developed during the initial state permitting processes several years ago. Have these costs been escalated to reflect base year (2008) current dollars before use in the estimate? If not, please do so. Also, the costs should be referenced to the specific referenced locations within the financial assurance documentation. Please clarify and revise accordingly.

d. It appears that percentages of total estimated construction costs have been used to approximate costs for items such as mobilization/demobilization, equipment installation, piping, etc. For example, Year 10 construction for the mine site water treatment includes these types of percentages for the treatment system. The basis for these percentages (guidance documents, empirical cost data, etc.) should be explicitly stated. Please clarify.

Literature Cited:

Buchanan, B.A. 2008. Personal communication between FS authors and Dr. Bruce Buchanan, of Buchanan Consultants, Ltd., Farmington, NM. June.

Brown, S.L., C.L. Henry, R. Chaney, H. Compton and P.S. DeVolder. 2003. Using municipal biodolids in combination with other residuals to restore metal-contaminated mining areas. Plant and Soil 249:203-215.

Brown, S., P. DeVolder, H. Compton and C. Henry. 2007. Effect of amendment C:N ratio on plant richness, cover and metal content for acidic Pb and Zn mine tailings in Leadville, Colorado. Environmental Pollution 149:165-172.

Brown, S.L. 2009. Personal communication on January 15, 2009. Dr. Brown is Research Associate Professor of soils, specializing in soil amendment use at disturbed sites, University of Washington, Seattle, WA.

Carlson, K.E., A.C. Radil and B.R. Romig. 2006. Biosolid applications at the Climax Mine: Revegetation and soil results. pp. 75-88. *In*: Proceedings of High Altitude Revegetation Workshop, No. 17., W.R. Keammerer (Ed.). Colorado St. Univ., Ft. Collins, CO. March 7-9.

McGeehan, S. 2006. Alternatives to topsoil in mine site restoration: A case study in the Coeur d'Alene (Idaho) Mining District. pp. 50-69. *In*: Proceedings of High Altitude Revegetation Workshop, No. 17., W.R. Keammerer (Ed.). Colorado St. Univ., Ft. Collins, CO. March 7-9.

Winter Sydnor, M.E. and E.F. Redente. 2002. Reclamation of high-elevation, acidic mine waste with organic amendments and topsoil. J. Env. Qual. 31:1528-1537.